Printerworld

September 25, 1987

TECHNOLOGY UPDATES

- Ion Deposition
- Solid Ink

PRODUCT SPOTLIGHT

Highend Dot Matrix

COMPUTERWORLD EXTRA!

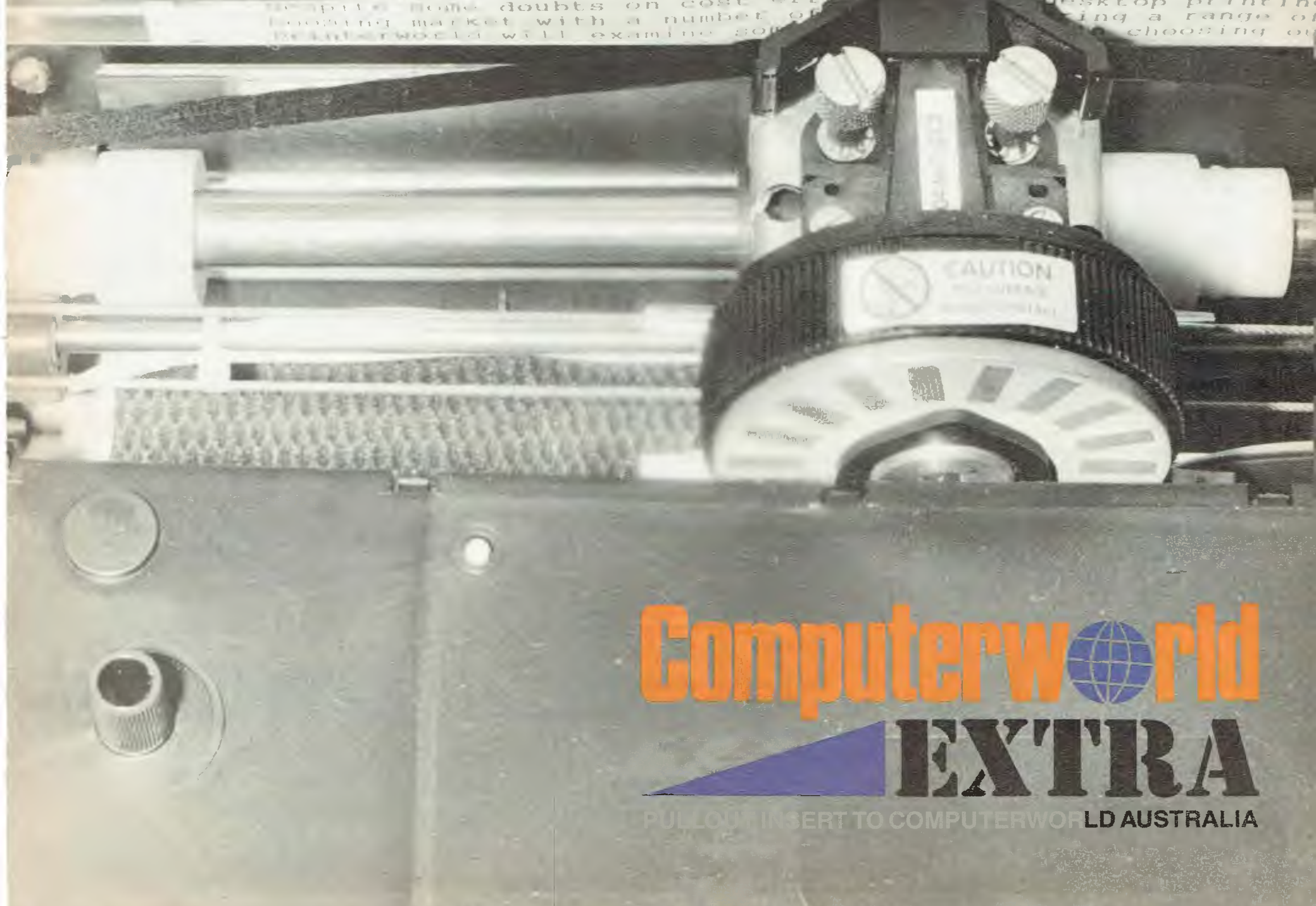
Printerworld

Pull-out insert to Computerworld, September 25

...on the vital field of print...
...product spotlight on highend dot matrix printe...
...printing machines.

...will also look at the latest trends in print...
...taking a peep into the future to see where the...
...technology should a DP installation consider t...
...advances while protecting existing investment?

...despite some doubts on cost effe... desktop printing...
...booming market with a number of... ...ing a range of...
...Printerworld will examine so... ...choosing ou...



Computerworld EXTRA

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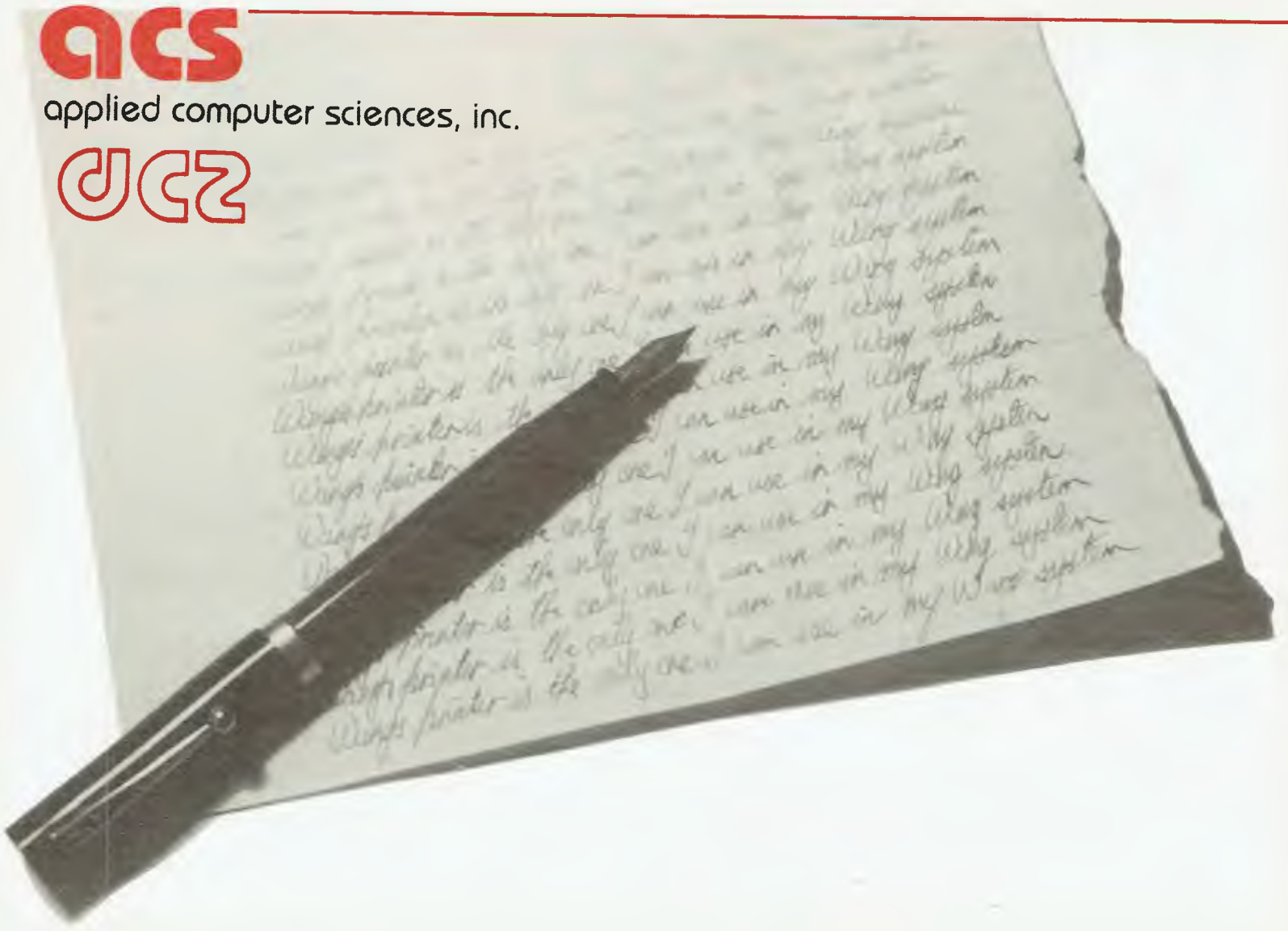

THE WANG LINE

One of the lines often handed out by Wang and other major computer system manufacturers is that their brand of printer is the only one suitable for use in their systems. This costly advice simply isn't so.

PUNISHMENT ... 800 LINES

Another painful aspect of some high speed printers is noise. Since moving on from the painfully laborious scrape of the pen, a succession of mechanical devices have clamoured and clattered at ever quickening pace through the paperwork of modern business. These three whisper quiet non impact printers are easy on the balance sheet and unobtrusive in the office environment.

ACS/H-P LASERJET 500 PLUS 8PPM

ACS/H-P LASERJET 500 PLUS 8PPM

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ACS/DATAPRODUCTS 1230 12PPM LASER PRINTER

This table top printer makes high quality page printing very affordable. One printer provides the speed of a line printer, the print quality of a daisy wheel and the versatility of a dot matrix printer

ACS/DATAPRODUCTS 1230 12PPM LASER PRINTER

with an extensive variety of fonts and optional accessories. Dataprocessing reports, word processing, envelope feeding, transparencies, and label printing are all within the capacity of this reliable 300 dot per inch, high resolution machine. Far quieter than the impact printers it could replace its easy to operate and very economical to run.

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ACS/DATAPRODUCTS 2630 26PPM LASER PRINTER

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UPDATE

Look for quality

Every printer has a specific role to play, Neville Angove explains

ONE OF the little in-jokes of computing is the Write Only Memory, or Wom. Nothing could be more useless than a memory that could only be written to and not read from, since the essence of a computer's operations is its ability to read memory and act on the instructions or data stored in memory.

A computer system without a printer is very much like a Wom. The printed output is the means by which people who do not have access to the computer get access to the data. Even for people who do have access to the computer, the difficulties of reading data a single screen at a time makes transferring this information to paper a necessary evil.

But in spite of the need for a good quality printer to be attached to a computer system, this peripheral receives the least attention and the least care.

The problem with a computer printer is that no single machine serves all purposes. Except in a limited number of cases, the computer itself is a general purpose machine that has been configured and programmed for a specific purpose or role, sometimes several roles. In none of these roles is it the perfect fit. For example, a standard personal computer can perform very well as a word processing system, but not quite as well as a purpose-designed word processor.

The computer printer differs from the computer in that its role is more limited: it is designed to produce hardcopy output in a specific format. Because of its specific-purpose nature, which determines the format of the output, it does not lend itself to a variety of printer-oriented roles without a great deal of compromise, or expense (although some printers, in my experience, serve well in the role of expensive paperweight).

The old cliche, "horses for courses", applies to printers. Virtually every printer offers a specific combination of price, output quality, output type, performance and reliability. Generally, the factor which changes most is the price.

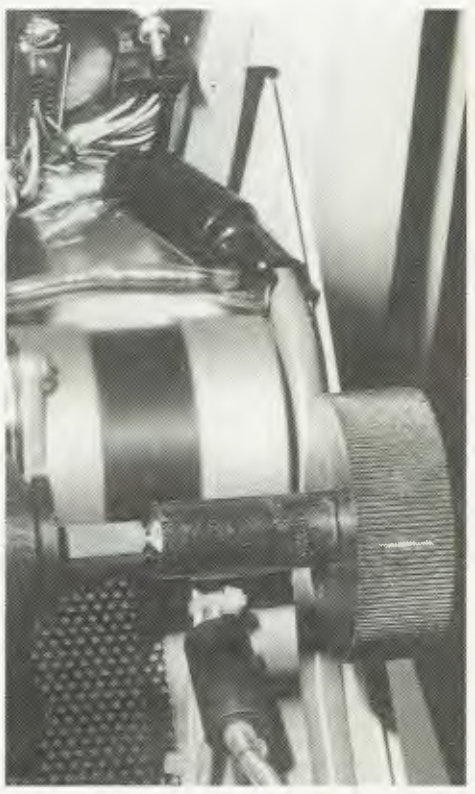
Alternatively, some printers are designed to excel in one area only, such as high-speed band printers to produce massive amounts of barely readable output in the shortest possible time, or high-quality electro-erosion printers which produce high-resolution masters for offset printing.

The primary consideration when selecting a printer is quality of output, which is determined by its role. It is impossible to improve the quality of printed output beyond the maximum level established by the printer's mechanical limitations.

The earliest high-quality — what we often call "letter quality" — printers were solid-element impact printers based on the IBM golfball typing element. But these were quickly surpassed by "daisywheel" printers such as those manufactured by Diablo. These achieved the quality of typewritten output simply because they used a typewriter-like mechanism, and like the typewriters they emulated, were restricted to very low speeds.

The critical factor was, and still is, the gross physical nature of the typing element and selection of character to be printed.

(Continued page 4)



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UPDATE

Rapidly falling costs create

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Simple inertia placed a limit on just how fast any character element could be positioned without an exponential increase in cost for a faster mechanism.

High-quality impact printing is still the province of the daisywheel printer, especially when either embossed paper or multipart forms are used. The old limitations still apply, in spite of advances in technology.

The daisywheel is slow (typically a real throughput of 15 to 45 char/sec), very noisy (64dBA abd above), very expensive (from $A1000 to $A3000, depending on speed), and not very reliable.

Because daisywheel printers are now being replaced by different technologies, the problem of continued support and maintenance is increasingly important. Even if a daisywheel is the perfect choice for an application, a lack of spare parts for a particular model means a breakdown is permanent.

If the application requires a solid element impact printer, but much higher throughputs than provided by a daisywheel, the alternative is the band printer commonly found attached to mid-range and mainframe computer systems.

The inertia of the typing element is overcome by having an embossed band passing in front of a hammer or hammer bank at high speed, with the correct character being "hammered" home when it moves into the correct location. Apart from a band printer's high cost, another problem is that the band cannot realistically be changed if you need to use multiple typefaces on the one page.

Solid element impact printers can be replaced in some applications by alternative technologies that offer advantages that frequently outweigh their limitations. These technologies include dot-matrix, laser and inkjet printing.

Dot matrix printers, usually found attached to most personal computers as utility printers, have developed to offer a number of advantages. Because they form each printed character out of a "dot matrix" formed by a vertical row of small pins, they can be programmed to print a variety of typefaces at high speed without changing printing elements.

The "dotty" appearance of the characters can be improved by using printing heads with more pins, or by making the printhead make multiple passes to print a line, and so filling in the gaps between the dots.

High-quality dot matrix printers offer almost the quality of daisywheels but with a higher throughput, and also have the ability to print multipart forms (although often not as many "parts"). They can also print bitmapped graphics at a reasonable speed.

Some disadvantages

Higher speeds than 400 char/sec can be achieved using shuttle-matrix printers, which use multiple printheads. These typically are attached only to larger systems, although some models can be run off small systems such as personal computers.

But there are still disadvantages that must be considered. Dot matrix printers are still very noisy, too noisy for the office environment without soundproofing (although the new IBM Proprinter II has a "quiet" mode, at the expense of much slower printing).

Because dot matrix models are still grossly mechanical, higher speeds mean greater expense, more noise and less reliability. As well, at high speeds the printing head may overheat, either self-destructing or dramatically slowing the print speed.

Unlike daisywheels which can operate for long periods continuously — at their slow speeds, they have to — dot matrix printers have a sharply defined duty cycle, generally around 25 per cent (meaning about two hours printing spread over an eight-hour day).

Dot matrix noise can be reduced by using thermal transfer printheads, where heat is used to force the image on to the paper. Unfortunately, the lower noise is offset by restricted number of models and the high cost of the special ribbons needed.

Other factors to be considered with dot matrix printers are real throughput, command set compatibility (most such are Epson or IBM compatible), builtin fonts/character sets, noise level, buffer size (important for serial operation), ribbon type, and monochrome or color operation. This last factor is important, since most of the new quality dot matrix printers now have options for four-color printing, something increasingly in demand by graphics-oriented or presentation software.

An alternative to dot matrix that offers most of the advantages but without the noise is inkjet printing. This technology sprays droplets of liquid ink on paper, with each dot effectively replacing the impact

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UPDATE

greater options

of a dot matrix pin. Because there is no impact of printhead against the paper/platen, noise is sharply reduced. The disadvantage is that multipart forms cannot be used.

But before one jumps into liquid ink technology, other disadvantages must be considered. Firstly, because the ink is liquid, it tends to spread along paper fibres, giving a ragged or fuzzy appearance to the output. If the paper quality or finish is improved to reduce this effect, the ink is slower to dry, which results in smearing. Another problem is that the ink can dry inside the ink nozzles, clogging them into inoperability.

The problems with liquid ink have been largely overcome, at large expense, through the use of phase-change ink. This ink is solid at room temperature, but liquified by heat then sprayed on to the media, where it dries almost instantly. The quality of the output is high, often surpassing laser printing, and running costs are low.

Two companies produce printers using phase-change ink. The Howtek Pixelmaster is a high-speed multi-color printer that spins the paper around a fixed print head to produce output that has been described as being almost a three-dimensional painting. The problem with the Pixelmaster is that it can only use single sheet paper.

An alternative technique is used by the Dataproducts SI-480 printer, which handles the printing unit the same way a dot-matrix printhead is handled. In fact, the whole design is based on a dot-matrix printer chassis. The quality is still high, but without the option for multi-color output, and the conventional design means standard paper formats can be used (including continuous paper).

One advantage of the SI-480 is that it is a line printer that can emulate a page printer, such as a laser. Printing line by line means the output can be checked when only partly finished, a major plus when testing new formats or the quality and accuracy of printing.

Some laser engines are de-rated photocopier engines, ensuring reliability and low cost per page

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The other non-impact technology available for computer printing (ignoring some of the more esoteric technologies, such as electro-erosion) is laser page printing. An electrostatic image is created on a printing drum by a moving laser beam and is transferred along with a toner to the paper, where it is fused by heat and pressure.

The big advantage of laser printing is that it is largely based on well-developed photocopier technology. In fact, some laser engines are de-rated photocopier engines. This ensures a high degree of reliability at relatively low cost per page. And although familiarity may breed contempt, it is an advantage in the office if the one technology is used in different roles.

Laser printing comes into its own when the preferred output is single copies of material that require the use of multiple typefaces or high-resolution graphics. Depending on the quality of the driving software and the controller, printing speed is usually at least four pages a minute, which translates into the equivalent of 250 char/sec (better than the real throughput of most desktop dot matrix printers).

Because of the combination of fixed speed print engines and variable quality software, laser printing has a number of peculiarities. If rated at a certain speed, that is the maximum speed even if each page contains only a single character (or nothing at all), since this is a limitation of the engine. But output can be slowed if a complex image has to be generated before it can be transferred to the paper. High-resolution graphics, for example, can take several minutes a page, and times of up to 30 minutes are not uncommon.

Since the electrostatic image is fixed to

(Continued page 6)

Japanese invade Europe

JAPANESE peripherals companies are strengthening their manufacturing presence in Europe following the new wave of protectionism in the US.

Although a common practice among Japanese consumer electronics companies, the movement to localise product content has been less widespread among the country's computer equipment makers until now.

Oki Electric Industry Co and Citizen have chosen the UK or their foreign plants. Oki will spend abut $A47 million building a 10,000 square metre plant in a former Burroughs site. Production, employing 340, is expected to begin in December.

Citizen will invest about $A14 million in the UK's Newcastle region. Its first business outside Japan, this 7000 square metre plant, with 300 staff, is expected to make 30,000 printers a month by the end of 1988.

Canon is expected to begin manufacturing laser printers this year at its plant in France's Brittany region. Epson has also invested in production of matrix printers in Bonneuil, France.

Japanese companies have had great success in Europe's microcomputer printer sector, which is showing strong growth. Epson, Oki, Fujitsu, Canon, NEC and more recently Citizen have acquired solid market shares.

A word of advice for those considering the purchase of an NEC or Epson printer...

Fujitsu.

The Fujitsu DL-3400 offers cut sheet printing without having to remove your continuous paper (think how important that is in an office), others do not.

The Fujitsu DL-3400 convincingly outperforms every comparable 24-pin letter quality printer.

The Fujitsu is significantly faster (240cps draft, 72cps letter quality) than both the NEC P7 and the Epson LQ1000.

The Fujitsu has a dramatically higher (4 ips) throughput speed.

The Fujitsu has a massive 24K print buffer while the NEC manages 8K and the Epson 7K.

The Fujitsu is quieter than both.

The Fujitsu offers a simple, plug-in colour option.

The Fujitsu offers additional fonts in cartridge form.

With all these superior performance characteristics, you might be wondering how Fujitsu compares in the reliability stakes.

Fujitsu has a significantly higher (8000 hours) Mean Time Between Failure than either of the others. It also has a longer (300 million strokes) print head life.

Perhaps you're wondering about pedigree.

But, once again, there is no comparison.

Fujitsu comes from Japan's largest and most esteemed computer manufacturer.

The only area of comparison left is backup support.

And Fujitsu is supported by Imagineering.

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It's easy to see why there is no other printer which can compare with the Fujitsu DL-3400.

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DEVELOPMENTS

● *Colin Flippence is managing director of Flippence and Associates.*

Users facing

Colin Flippence predicts vast changes in the range,

AFTER seven years specialising in configuring and selling printer systems, one of the questions I am most often asked is: "What developments are going to occur in the printer field in the future?" This question usually elicits a technical response about desktop lasers getting cheaper and more flexible, 200 char/sec matrix printers becoming a consumable item, and so on.

The topic on which I was asked to write this article is very similar — the future of printers. It is a topic very near to me at the moment, because for my own benefit, I have been pondering exactly that question and come to the conclusion that the future has many aspects besides the purely technological changes.

In some respects technological aspects of development are key features of the product in a sales situation. They are easy to concentrate on. However, it is really the benefits derived from those features that ultimately meet the needs of customers.

It is the benefits and changes in the marketplace brought about by technological improvement I would like to discuss.

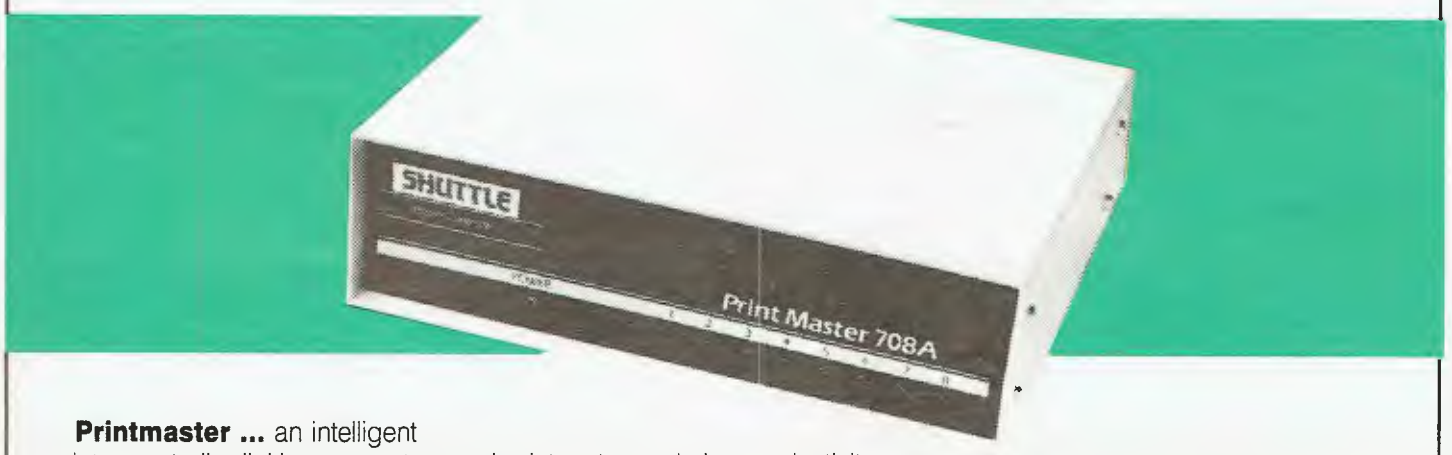
Factors affecting the Australian printer market are, I believe, unique. First, we have a shortage of printer manufacturers as such. Second, we have a significant number of entrepreneurial marketers who continually visit major offshore computer shows.

Third, we have a disproportionate level of direct involvement by Japanese manufacturers — mainly due to the lack of local manufacturers and our relatively close proximity to Japan.

These factors have produced a very enlightened market. Australian entrepreneurs have been able to select from a wide variety of proven products from overseas to sell in Australia.

This has enabled customers to receive a range of quality products without the attendant inferior offerings. Also, because most of the major US and European manufacturers were not present in Austra-

PRINTER SHARING
PRINT BUFFERING
IN ONE VERSATILE UNIT



Printmaster ... an intelligent printer controller linking computers and printers to maximise productivity.

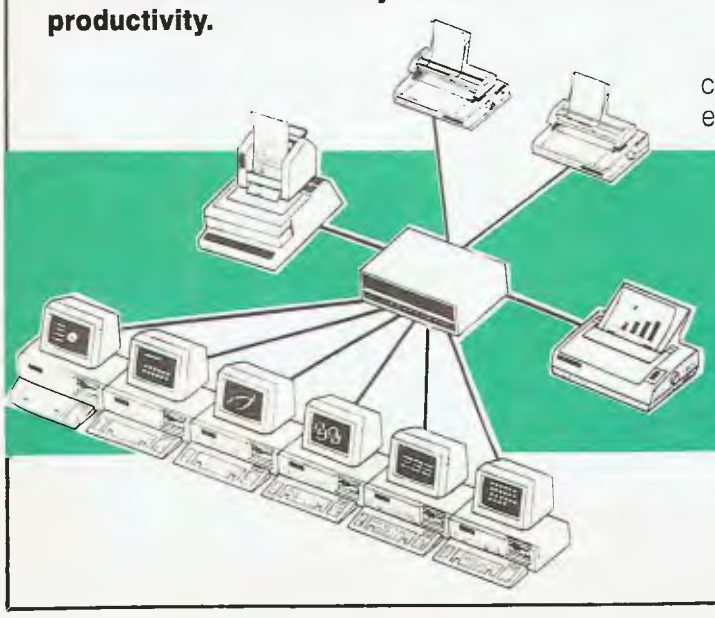
Up to nine computers can share one printer; one computer can drive nine printers, and anything between. And Printmaster's built-in buffer spools data to maximise productivity.

Printmaster comes in six, eight and ten port models that feature serial, parallel or combination serial/parallel ports. Ports can be configured for any combination by answering questions from the easy-to-follow menu. You can also menu select baud rate, word size, stop bits, parity, XON/OFF handshaking, disconnect time-out and form feeds. All changes are made in non-volatile memory.

All connected users can send data to the 512k common pool buffer, at the same time if need be. Data is then sent on a first in first out basis to the selected printer. If more memory is required Printmaster's buffer can be expanded to one megabyte.

If a computer is sharing several different printers such as a letter printer, a laser-jet and a plotter, you merely insert a short user-definable printer select code as the first characters of your data.

Printmaster is that easy. It's that versatile. It does (dare we say it again) maximise your computer productivity.



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"Where innovation, quality and economy ARE compatible."

Print quality main factor in choice

(Continued from page 5)

the paper using heat and pressure, laser printers do not produce the best quality on heavily embossed papers. Often the image will flake off unless it receives extra heat curing. Another problem caused by the method of fixing the image is that most lasers often seal any envelopes passed through them. Because lasers are non-impact, they also are not able to print on multipart forms.

The final difficulty is that only cutsheet paper can be used, with few exceptions. The high-speed and high-cost (hundreds of thousands of dollars) laser printers attached to mainframes, such as the IBM 3800-3, handle only continuous paper.

Cost falling

Other considerations in choosing a laser include the size of input paper trays (especially if the printer is shared between several computers), the size of the output tray, printing resolution (most often 300 dots/in), the life cycle of components (printers based on the Canon print engine need to have the drum replaced every 3000 pages or so), output speed (from four to 26 pages a minute for desktop laser printers) and the printer emulations handled (most commonly) the Hewlett-Packard Laserjet, the Diablo 630 daisywheel and the IBM/Epson dot matrix printers).

Due to the rapidly falling cost of computer printers, it is not necessary to make a single printer technology serve all purposes. Often a combination of two printers can be handled easily by even the most elementary software. The technologies described are common enough, and standard enough, to be sure bets when selecting a computer printer, unless requirements are significantly esoteric.

● *Neville Angove is principal of the consulting company Neville Angove and Associates, which advises on the acquisition and use of personal computers and related products.*

DEVELOPMENTS

a revolution

prices, and sales/purchasing cycles of Australia

lia until recently, the market received their products via third-party groups such as BDS Computer, ADE, Warburton Franki, and STC.

These groups often provided the advantage of adapting printer products into situations where they were not being employed in other parts of the world. This skill of adaptability is one, I believe, which holds significant consequences for future changes and growth for the printer market in Australia.

Today, 14 years after Dataproducts initially started selling printers through distributors in the disguise of "specialist OEMS" the major manufacturers are finally producing products in the laser, line printer and high speed matrix arena which are "plug compatible". This has significant consequences for dataprocessing installations.

Until now, if customers wanted to buy a system printer with a specialist interface, such as IBM Twinax, but did not want to pay the prices charged by the system supplier, they needed to deal through an organisation which "specialised" in providing "plug compatible" printers. The specialised nature of the sale commanded a significant price for the product (see Table 1).

Today, because manufacturers produce pre-configured printers the need for specialisation, in a lot of situations, has disappeared. Therefore the cost of connecting into, say, an IBM system, has been reduced (see Table 2).

It can be seen from Table 2 that the cost ratio for plug compatible versus the system house-supplied product is significant. The difference between costs for the Wang configuration, which is still a specialist connection, and the manufacturer supplied IBM connection, is very favorable for the IBM customer.

The cost difference between the IBM specialist connection and the manufacturer-supplied connection is also favorably reduced.

Such a scenario can be demonstrated across a range of systems.

The future will see a greater involvement by US and European manufacturers in Australia. Dataproducts and Genicom/Centronics have already established subsidiaries in Australia with the specific intention of servicing the Pacific basin. Future government involvement in the computer industry will ensure more local content and commitment from those and other existing offshore manufacturers.

To date only Dataproducts, Genicom and Fujitsu have started to integrate controllers in their printers. However, it will not be long before other manufacturers start to market their own offerings.

These two points mean that customers will have a more readily available source of compatible printer products, with manufacturer support locally. Software houses and "non-specialist" hardware suppliers who have generally steered clear of the compatible market will be able to offer customers easily installable system printers at very competitive pricing.

For the user, this represents a revolution in the sales/purchasing cycle, reduced costs, and an increased range of products. Given their support mechanisms are in place, through manufacturers, the trend could have a significant effect on budget allocations for printer purchases in the future.

Table 1 — Increased cost of plug compatibility

	Standard serial connection	Standard Centronics connection	IBM system 3X	Wang VS
Dataproducts B600, 600 lpm band printer	17,230	16,900	16,900	16,900
Interface	N/A	N/A	3300	3000
Total	17,230	16,900	20,200	19,900

Table 2 — Cost effect of manufacturer-supplied compatibility

	$
IBM list price 600 lpm System 3X (approx)	29,400
Wang VS list 600 lpm	28,800
Centronics 800 lpm Wang VS	18,224
Centronics 800 lpm IBM S/3X	17,200*
Standard Centronics 800 lpm	15,500
Standard Dataproducts B600	16,900
Dataproducts LB600 IBM S/3X	16,100

** New integrated printers*

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TEK 0069

SOLID INK

The keynote

Paul Press looks at a development that overcomes

● *Paul Press is general manager of Dataproducts Corp Australia, a subsidiary of Dataproducts Corp of the US.*

SCIENTISTS have observed and experimented with inkjet printing for at least 200 years, but it was not until the 1950s that basic research and development work resulted in the patents that are the basis of today's inkjet projects. Work in this area has increased dramatically, with a proliferation of new products either on the market or under development.

The marketing push behind inkjet research stems frm the fact that high-speed printers using mechanical impact to print a character suffer from a number of problems. Chief of these are the maintenance of mechanical tolerances at high duty cycles, excessive heat generated from friction at high speeds, the problem of overcoming the inertia of bulky components at high operating speeds, and excessive operating noise.

Since the essence of the inkjet mechanism is a low-weight print head that has few moving parts and no mechanical contact with the print media, inkjet technology was seen as a significant means of increasing printing speed without increasing other costs. Unfortunately, the removal of some problems has resulted in the creation of others associated with the handling of volatile liquids.

The latest development in inkjet technology has been the use of solid or phase change ink that offers the benefits of inkjet technology without the bulk of the problems that have plagued this technology. One of the first commercial products to use solid ink technology to replace serial impact printers — and to some extent other classes of non-impact printers — is the Dataproducts SI480 Solid Ink Printer.

Dataproducts Corp acquired Imaging Solutions Inc, formerly known as Exxon Printing Systems, in July. Dataproducts and Exxon had operated this company as a joint venture, developing the hardware and solid ink technology that is central to the operation of the SI480 solid ink printer. With this acquisition, Dataproducts now owns all rights to the proprietary solid ink technologies and associated products.

Low viscosity

Solid ink printing represents a state-of-the-art technology with broad applications in the production of executive-quality office automation output. The research into this technology focused on insulating the ink/dot quality from its interaction with the media surface. This led to the development of an ink that is solid at room temperature but which changes phase into a liquid at elevated temperature. Before this development, inkjet printing technology commonly used water-based or oil-based/non-aqueous inks.

Water-based inks are very sensitive to the type and quality of the media. The low viscosity ink tends to "wick" into the paper fibres, causing a ragged and dull appearance to the print. Attempts to minimise this effect by using highly calendared or filled papers often results in the ink not being held by the paper surface, leading to smearing of the print.

An additional problem found with many drop-on-demand printers using water-based inks is the clogging of the inkjet nozzles because of evaporation. Oil-based/non-aqueous inks do not dry in the nozzle, and also print on a wider range of media quality. They do, however, have a low optical density, and the wicking problem still persists on some types of paper.

Solid ink or phase-change ink vastly improve print quality because the ink solidifies on contact with the media surface. The ink does not wick into the paper fibres, not does it smear, and the problems of evaporchanged from that used in serial matrix printers. The well of potential uses for this technology has yet to be tapped, and as the thinking of developers slowly comes to terms with the advantages of solid ink technology, the computer industry is certain to see a large number of imaginative and productive applications of which the Dataproducts SI480 is only the barest promise.

Sheet Lightning

The LZR 1230 fully loaded with accessories for optimum paper handling.

LZR 1230

This table-top model brings the benefits of laser printing to a range of systems. The LZR 1230 is compatible with Diablo™ 630, Epson™ FX-80 and H.P. Laserjet Plus™ and supports the IBM™ PC™ graphics character set.

The LZR 1230 print engine produces crisp, finely formed characters and, when the system permits, bold graphics. The resolution is 300 dots per inch. The dual component developer (a magnetic carrier plus toner) aids clarity by preventing "fuzzing" around the edges.

Works with three different systems at once

With three concurrent interfaces (Centronics™ parallel and two serial ports), the LZR 1230 can be shared simultaneously by three systems. This reduces the cost per user and contributes to the overall low cost of operation.
Output is up to 12 pages per minute. With that kind of speed, the LZR 1230 printer can replace several impact devices.
Rugged construction extends the life of the printer — estimated at 600,000 pages — and makes the per page cost remarkably low.
The LZR 1230 can support up to 10 work stations and is perfect for multi-user, personal computer systems.

Superior paper handling

250-sheet input and output meets the needs of most users. Accessories expand the range of solutions even further.

Easy to use, office suitable

The LZR 1230's control panel was designed to respond to the needs of both the casual and the sophisticated user. The 16-button key pad and 16-character liquid crystal display allow you to operate the menu-driven system without consulting a manual. The LCD flashes messages in plain language, eliminating the need to look up numeric status codes.

LZR Series™ Laser Printers

Dataproducts

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US-Europe laser contract

Wenger Printers G of Switzerland has signed a four-year contact to buy Dataproducts' LZR-1200 and LZR-2600 series of US laser printers. Wenger will add special fonts and market them under its own label in Europe, providing documentation, integration and service. The deal is costing Wenger $US18 million.

SOLID INK

is quality

evaporation and nozzle clogging

ation and nozzle clogging that have plagued inkjet printers have been overcome.

The SI480 uses solid ink pellets that are packaged in a small cartridge. They are loaded into the printhead where the solid ink is liquified at approximately 70°C. The ink reservoir and ink channels are heated to maintain the ink in the liquid state until the moment it is ejected from the inkjet nozzles, with this process eliminating the problem of ink evaporation causing nozzle clogging. (Once the printer is installed it is typically left in low-power standby mode to maintain the ink in the liquid form, and fully powered-on at the start of each business day.)

The liquified ink is supplied to a small compression chamber, which is connected to a piezo-electric transducer. The transducer, under software control, contracts when fired by a low voltage firing pulse and increases the volume of the pressure chamber. The transducer then returns to its original state, creating a pressure wave that forces a droplet of ink through one of 32 nozzles on the orifice plate. This device acts as its own pump and there is no requirement for supplemental pumps or ink recirculation.

'The edges of the dots are sharply defined . . . with a limited degree of absorption on paper surfaces,

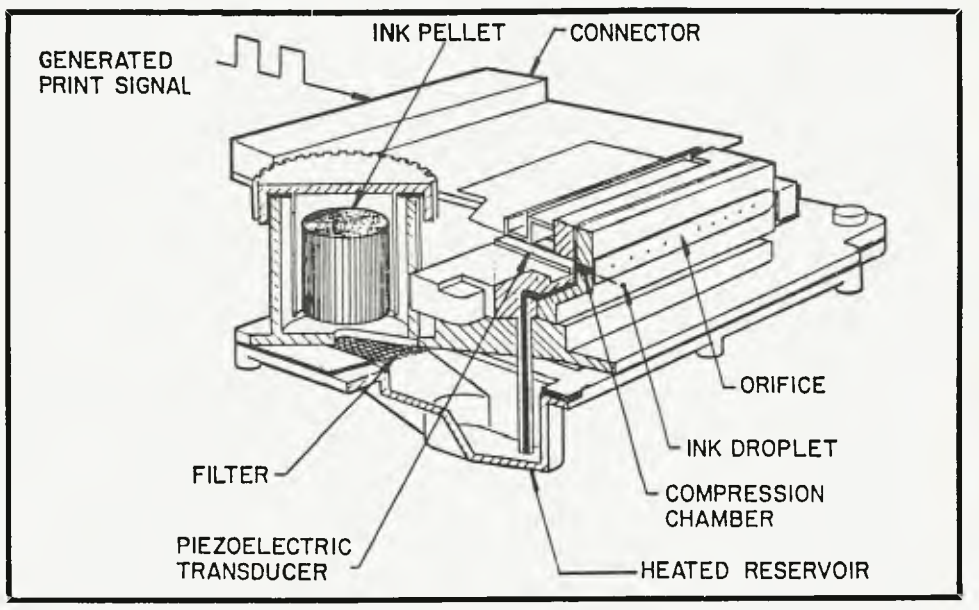
Each nozzle on the orifice plate is 0.002in in diameter, with the amount of ink being ejected a function of the nozzle diameter and the length of time/degree of force the ink from the compression chamber. The ink drop "freezes" within 250msec after anchoring itself to the receiving media, with each dot typically being approximately 0.006in in diameter. The edges of the dots are sharply defined, and the short delay between the ink drop striking the media surface and its freezing results in a limited degree of absorption on paper surfaces.

In its executive-quality mode, the SI480 prints at a rate of 200 char/sec with a horizontal dot resolution of 480 dots/in and a vertical resolution of 240 dots/in, a holdover from the IBM Advanced Function Printing capabilities originally installed into the printer's firmware. At this dot density, the SI480 has a 28 per cent higher dot density than the typical laser printer, which offers 300 by 300 dots/in.

The solid ink technology offers a number of significant features to the office automation market:

- Media insensitivity, including the ability to print on papers ranging from sandpaper to toilet tissue but more importantly on quality bond letter head and embossed papers;
- At 200/400 char/sec, an ink firing rate of 10KHz, equivalent to more than 10,000 individually placed dots/sec;
- The ability to advance this technology to print vivid color at up to 1000 dots/in density;
- The potential to replace low to highend impact printing technology in virtually all areas where only single-part stationery printing is required;
- Low operating noise, high reliability and low operating cost.

The Dataproducts SI480 is a marriage of solid ink technology with conventional serial printer technology, to the point where the gross printer mechanism (and even much of the software) is virtually un-



An exploded view of a solid ink printer head

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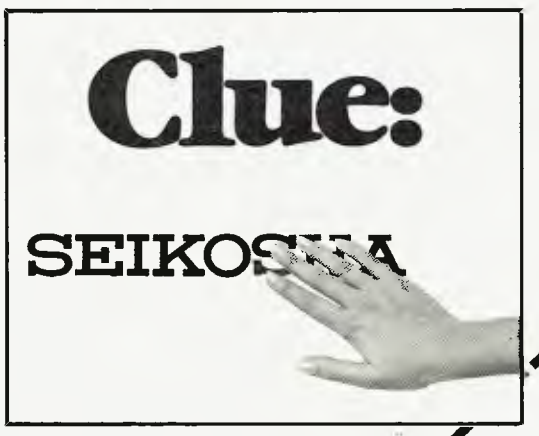

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ION DEPOSITION

'Cheaper and better'

Quiet, reliable and low on power use, ion technology offers excellent

We all know how rapid advances in technology can tend to make some computer hardware outdated almost at the moment it is installed.

Just the same, few in data processing could or would have predicted that the new darling of hard copy — the laser printer — might be outdated even before the honeymoon is over.

The speed and versatility of the high-tech, non-impact laser printer has dazzled the computer world. The very title conjures pictures of futuristic wizardry. And there is no doubt that the laser printer has relegated laboriously slow impact printers to the museum floor.

Yet, even as managers of information systems join the queue to buy laser printers, a new advance in printer technology has arrived. It is called *ion deposition*. Obviously not named by a marketing man, it is a title which lacks the imagery of its laser brother, requiring explanation.

Ion deposition is a non-impact process. The difference between impact and non-impact equates with the printing shop difference between letterpress and offset lithography.

Non-impact offers far the best alternative for both economy and quality. Here the similarity between laser and ion deposition printing ends.

The revolutionary ion deposition concept eliminates the use of special papers, complex heat fusing and costly developers, which are inherent in higher cost laser printing. Reliability is a critical component in assessment of a printer's worth, and here ion deposition streaks to the lead. This is partly due to the fact that ion deposition imaging does not require delicate light-sensitive surfaces or complex electro-mechanical hammers.

More importantly, ion deposition uses a cold fusing process which does not require heat or developers to fix the toner to the paper. So the printer requires a minimum of moving parts — on average less than 400, compared with about 4000 in a laser printer!

An ion deposition printer is far less likely to break down.

Quite simply, an ion cartridge sprays the surface of a hard print drum with charged particles (ions), to form a latent image to which toner is attracted. The drum rotates, transferring toner to a sheet of paper, using cold fusion.

The high-speed ion deposition printer, with its few moving parts presents numerous operating advantages over lasers. It is low in power consumption, low in heat dissipation (especially compared to laser printers which use heat fusion), and is remarkedly quiet — around 50 decibels, or quieter than typewriters. It also has a small footprint, requiring less room.

"Better than 98 per cent of ion deposition toner is transferred to the paper," said John Grimley, product marketing manager with the Corrd division of the Computer Resources Co, Australian distributor of the Datagraphix 4800 ion deposition printer. "That compares with an average of only 65 per cent to 70 per cent toner transfer with laser printers".

Grimley said Computer Resources went through exhaustive research and evaluation before taking on ion deposition printer distribution in Australia. A long and satisfied customer of Datagraphix, CRC looked at the American group's laser printers, before discovering that Datagraphix was among the pioneers of ion deposition technology.

"Ion deposition has been a commercial reality in the US for several years now, since it was developed by Delphax Corp in Canada, and it is swiftly gaining acceptance in North America as the way to go," said Grimley.

Having spent so much time and money

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Makers adopt HP language

TO PROMOTE wider use of its Printer Command Language (PCL), Hewlett-Packard will for the first time license the language to other hardware manufacturers for use in their products.

Announced at the Seybold Desktop Publishing Conference in Santa Clara, California, this month were PCL licences for Compugraphic, Tegra, Wang, Olivetti, and Tandem.

HP wants PCL to become the industry-standard printer language for users who do not need the high functionality and added cost of printers to an installed base of more than a million PCL printers.

Compugraphic and Tegra are developing PCL-based typesetting systems, while Wang and Olivetti said they will produce PCL laser printers, the spokesman said. Tandem will resell the HP Laserjet Series II under the Tandem name. Wang, Olivetti, and Tandem will supply products within the next three months.

In other Seybold news, Ricoh Corp said it would distribute a turnkey desktop publishing system under the Ricoh name by the first half of next year.

ION DEPOSITION

than the laser

results for less. Stephen Dando-Collins reports.

looking at laser printers, CRC knew their strengths and their weaknesses. CRC knew that a market existed for an environmentally friendly, high speed, non-impact printer with low operating and maintenance costs, one which would carry a price tag well below that of a comparative laser printer.

"In fact, the 75 page per minute Datagraphix 4800 ion deposition printer is half the cost of comparative laser printers. This allows the DP department to think seriously about purchasing two Datagraphix 4800 units, to provide both a backup facility and if needs be, a 150 page per minute."

Grimley positions the Datagraphix 4800 against such lasers as the Xerox 8700, which is more than twice the price of the ion deposition printer — not that he pretends Datagraphix can match all the options of expensive laser models, such as automatic duplexing. But the 4800 more than matches the Xerox for speed, he said.

"Productivity, reliability, and economy — that's how you can sum up an ion deposition printer," said Grimley. "It is designed to replace high-speed impact printers at a competitive price and with a performance which can be two to four times that of conventional impact printers.

Changes on run

"This system additionally provides operational flexibility and cost savings by allowing users to standardise on A4 stationery and incorporate electronic forms, logos and signatures with print data, without degarding the printer's performance."

Productivity is also enhanced by the fact that form changes can be made on the run as required, without stopping the printer and reloading special stationery which in turn has to be stored on site in sufficient quantities to meet demand."

Grimley said maintenance requirement were also attractive. "The ion cartridge has a 175,000 page life. It is easily changed by an operator, as can the erase rod which lasts half a million pages. These items, together with the transfix kit service (every 1.5 million copies) come within the normal CRC maintenance contract.

"In many instances, the ease with which an operator can make the few necessary parts replacement can virtually eliminate costly after hours maintenance contracts."

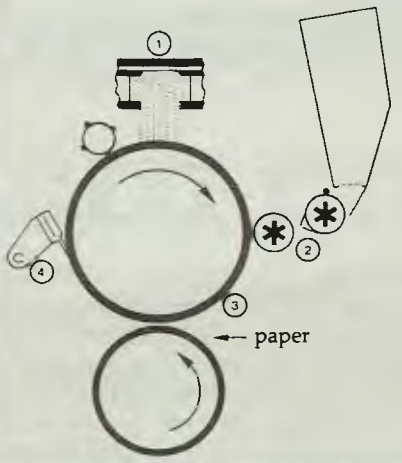
Tom Doxford, general manager, information, systems, at Legal & General Australia, was unafraid to be "first cab off the rank" when he installed a Datagraphix 4800 at the company's Sydney head office early this year.

The unit he said, has exceeded expectations for productivity, reliability and economy.

John Grimley summed up: "When a technology is faster, cheaper, quieter and demonstrably more reliable than its competition, you'd be crazy not to look at it."

● *Stephen Dando-Collins is co-creative director of the advertising agency Omnigraphic. He edited and co-authored* 2000 AD, *published by Pan Books in 1986, and was for a time a consultant to the* Beyond 2000 *television program.*

Ion Deposition Imaging



1. An electrostatic image is generated by directing an array of charged particles from the patented ion cartridge toward the rotating cylinder.
2. As the cylinder rotates, a single component magnetic toner is attacted to the latent electrostatic image on the cylinder.
3. The toned image on the cylinder is then "transferred" to the paper through cold pressure fusing. Because the cylinder is hard, extreme pressure can be applied during transfixing, producing a transfer rate of almost 100 per cent.
4. The trace of toner remaining on the cylinder after transfixing is mechanically scaped off before the remaining charge is neutralised by a solid state erase head.

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GENERAL

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LASERS

Multi-user machines are here to stay, writes Jacques Grenot

Beaming in on markets

IT IS often lamented in Australia that the very best ideas produced by our thinkers never make it to market, or are scooped up by enterprising overseas companies which not only take the credit but reap the rewards.

With laser printers however, things are different. Development of the desktop laser printer engine in Japan in 1983 brought the opportunity for an enterprising Australian company to take this embryonic concept and develop it into a marketable product.

Today, Impact Systems Ltd is the only company in Australia involved in extensive research and development of laser printers, working with the technology at a very basic level and putting together the logic to produce a high-quality printed page.

Although laser printing has been around since the early 1970s, when ultra high-speed devices printing on continuous stationery cost more than $US100,000, it was not until Canon offered the LBP-CX mechanism in the spring of 1983 that laser printing became affordable for the vast majority of computer users.

Since then, affordable laser printers have moved from the "personal printer" domain to highly sophisticated, multi-user machines of eight, 15 and 20 pages a minute.

At Impact, the development of laser printer products has involved harnessing the driving system to produce a printed page. That harness is the controller, a printed circuit board designed to accept the data stream from the host computer and manipulate the instructions to produce the desired effect on the page.

But how does all this really work? With some minor differences, the image printing process works in the same fashion as a conventional plain paper copier, while the image creation occurs like a high-resolution dot matrix printer.

The surface of a photosensitive drum is scanned by a laser beam as it rotates. The laser beam is modulated, on and off, to produce dots wherever required on the final image. As the drum rotates, it collects particles of the toner in the places where the laser beam has struck the drum surface. These particles are then transferred to a sheet of paper as it moves under the drum.

The paper with the toner particles then passes between two heated rollers, which cause the toner to fuse to the paper surface, creating the final fixed image.

The dots created by the laser are 1/300th of an inch in diameter. Thus, very high resolution printing can be created by forming characters out of an array of these dots. The dots used to form the image are small enough to be barely detectable by the naked eye, so resulting characters appear well-formed.

Real challenge

The real challenge in laser printing comes in generation of the signal used to turn the laser beam on and off to create the desired image. Thus each laser printer has a controller built into it, which converts the output from the host computer system into the image.

Because the laser printer is a page printer (it must print a complete page once printing commences), this controller must be able to store the information necessary to create that page.

The information can be in two forms:

- Descriptors of the characters to be printed and their location on the page.
- The dot image of the whole page to be printed.

The first option requires a minimal amount of memory, and controllers which work in this fashion will have as little as 64K-bytes of memory. To accommodate the second scheme requires the controller to have one to two megabytes of memory. Obviously this is a much more expensive proposition.

Along with these memory differences, there are other fundamental differences in controller architecture which determine the number and size of fonts which can be printed as well as the final speed of the printer.

As the market is demanding more performance from the controllers with faster throughput, higher resolution, and even color, the engineers are making demands on processing power and memory to achieve it. The limit is the extent to which technology is making these facilities available at a price the market is willing to pay.

One of the ways Impact Systems has addressed these economics and performance issues is through the use of its own gate array technology.

Gate array technology allows the development of custom chips which provide the opportunity to replace a number of standard chips with a single customised element. This, together with higher capacity memory chips and faster microprocessors results in higher density, and smaller boards offering greater performance.

So speeds have increased — with desktop models available up to 15 pages/min, and features added such as duplex printing and the ability to accept larger paper.

● *Jacques Grenot is director, product development, Impact Systems Ltd.*

Importantly too, these developments have overcome a major problem encountered by the "first generation" desktop laser printers — page too complex.

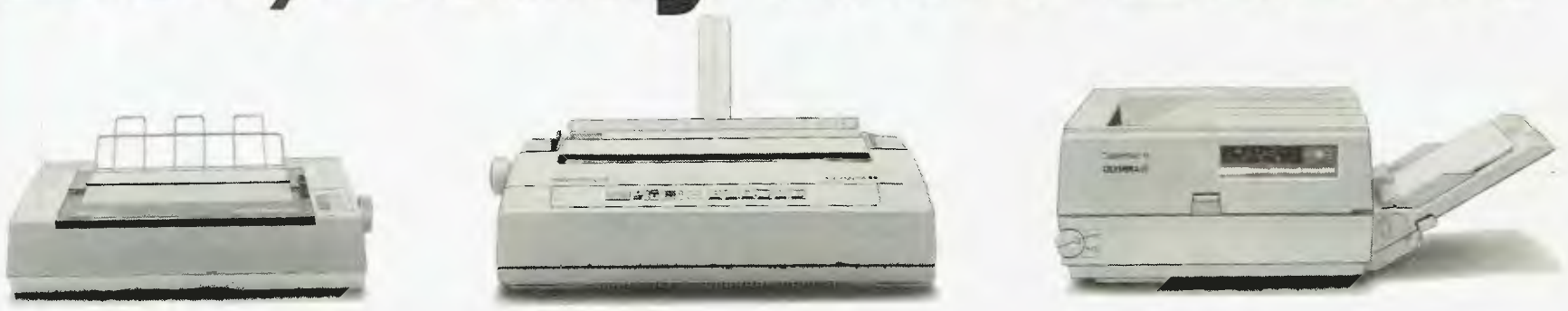
This has been achieved by moving to a fully bit-mapped page, requiring greater memory capacity, which removes all the existing restrictions on how complex a printed page can be. This external memory can also be used for storing more fonts, forms overlays, custom forms, logos and signatures.

More memory is also required for the introduction of color to laser printing.

Laser color printing uses the same principles as traditional offset printing — four basic colors make up the full color process. Each of these requires its own memory component and, in turn, to maintain speed in a color and high resolution environment, additional processing power is required.

This mix of memory capacity and processing power has always been recognised by Impact as being critical to machine performance. From the original design of the L800 series, dual 10MHz microprocessors were used, and a memory upgrade path created.

Dot, Daisy and Laser.



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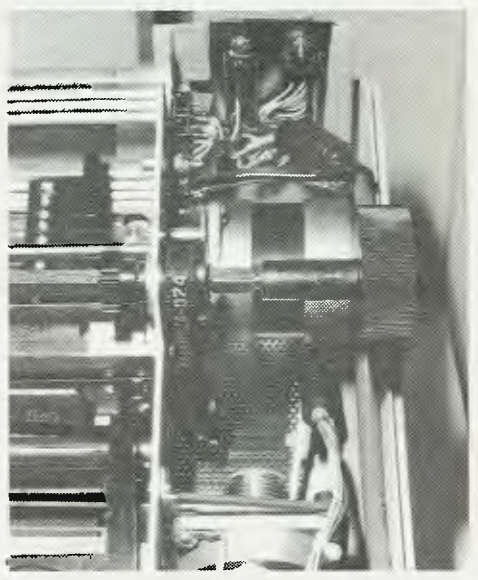
IMPACT

Impact printers still rule the roost, Corinne Kody reports

Old favorite a stayer



DESPITE all the fanfare surrounding desktop publishing and laser printers, impact printers remain the favorite solution for many enduser applications and vertical markets.

In 1986 daisywheel, serial dot matrix, line character and line matrix printers accounted for more than 86 per cent of all printers produced, according to IDC, a market research company.

Daisywheel printers: Although daisywheel deliveries are declining due to market erosion by 24-pin dot matrix printers and laser models, applications still exist for these high-resolution printers.

Daisywheels are useful for businesses that want letter-quality print and for offices that have low-volume requirements that do not need particularly high speeds. Daisywheels are also sought by those with a need to print multipart forms. While 24-pin printers are capable of handling multipart forms because of the fineness of their print wires, the multiple copies are not always as clear as those produced by full-character printers.

Daisywheel printers are viable for legal, consulting, financial and government sectors.

Serial dot matrix printers: In 1986 more than 3.6 million serial dot matrix printers were sold in the US, more than 90 per cent are used at least half the time to generate reports, letters, memos, spreadsheets and so forth.

More flexible

Serial dot matrix printers meet user requirements for print quality, reliability, price, speed and software support. In general, they offer greater paper-handling flexibility than nonimpact printers in accommodating envelopes, continous forms, labels and of paper sizes.

There is an enormous amount of software for serial dot matrix printers especially the 9-pin models.

As users increasingly demand to integrate text and graphics, impact dot matrix printers are beginning to find a place in the world of business graphics. There are a number of advantages.

Due to their high speed, serial impact dot matrix printers are suitable for draft graphics output. They also support color and multiple fonts and fit a variety of budgets.

Line printers: At the high end of the impact printer spectrum, impact technologies have dominated corporate MIS. Line character printers traditionally have been known as the workhorse of MIS. Despite recent competition from nonimpact printers, the line character printer's combination of high reliability, sharp print quality and high speed will ensure their retention in MIS departments.

Line dot matrix printers have shown signs of improved reliability and print quality, warranting consideration as an alternative to traditional line character printers.

As at the desktop and departmental level, the need for integrating graphics and text is also growing within data processing departments, and a logical solution is the line matrix. It is a cost-effective approach supplying both the print flexibility of the serial dot matrix printer and the speed of line character printers.

Another application in which impact technologies are playing a major role is demand barcode printing. Demand bar code printing will accelerate in the next few years, with an average US unit growth rate of 29 per cent until 1991, according to IDC.

Impact matrix printers are the clear favorite for demand barcode label printing, because they offer a wide number of advantages for this highly flexible application.

Undeniably, nonimpact technologies will grow in the next few years; however impact technologies will not disappear. IDC estimates a 10 per cent average annual growth rate for impact printer shipments up to 1991. Clearly there will continue to be applications and vertical market niches requiring the many attributes of impact printers.

● *Corinne Kody is US-based manager of the printer market program at International Data Corp.*

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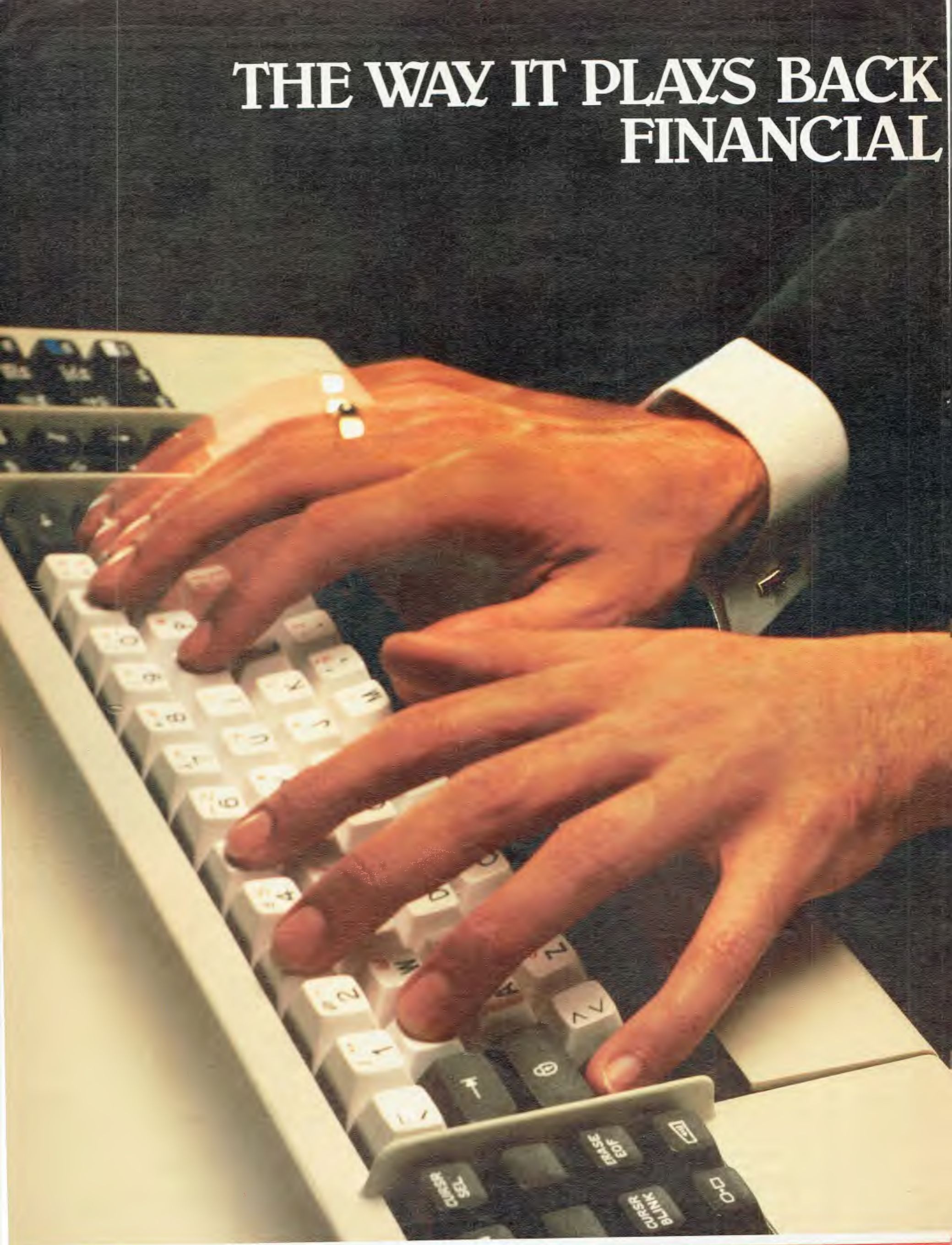

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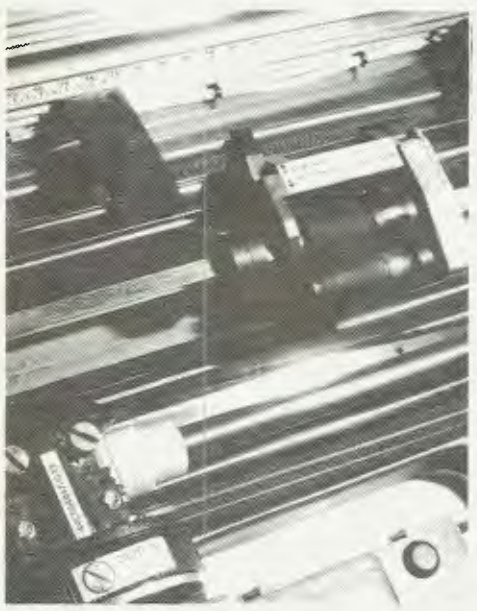

Users are benefiting as 24-pin models proliferate. Angele Boyd reports

Bright future for the serial matrix

A few years ago, gloom was forecast for the serial dot matrix market, and a vendor shakeout was expected. That this did not happen is due, in large part, to high-resolution dot matrix printers — 24-pin models.

According to International Data Corp (IDC) research, all serial dot matrix printers had a 16 per cent unit growth rate in 1986 topping overall printer market growth. Accounting for about 9 per cent of all serial dot matrix printers, 24-pin models sold at close to a 200 per cent growth rate in 1986.

The beneficiary of this trend is the enduser, who now can easily find a printer to fit application needs and pocket. Nine-pin printers sell for as little as $US250 to $US350 for low-volume, draft-quality output. For between $US500 and $US750 an enduser with moderate volume and near-letter-quality needs can also find a suitable nine-pin printer.

For even faster speed with near-letter-quality output, 24-pin printers may be more appropriate. These list between $US700 and $US750 for a narrow-carriage version and between $US1000 and $US2000 for a wide-carriage version.

Two factors account for the price/performance choices: the growing presence of non-impact technologies, and price-cutting by Japanese vendors.

Non-impact printers are probably the driving force behind the enhanced features and falling prices offered by serial dot matrix vendors. The advent of the non-impact desktop laser in 1984, with its letter-quality print, relatively low noise and speeds faster than available desktop printers, sparked interest in other technologies having some or all of these qualities.

High-quality output is rated first in importance by endusers, according to IDC, and serial dot matrix vendors are responding to that need.

Vendors have put more print wires, or pins, in the heads of 24-pin printers and, in the case of nine-pin models they offer a near-letter-quality mode in which the printer makes a double pass over printed characters. The difference between the two approaches is speed and price.

Falling prices

Twenty-four pin printers achieve better quality than nine-pin printers in a single pass, In making a double pass to achieve comparable quality, nine-pin models of course offer less speed. Twenty-four pin printers, typically higher priced than nine-pin types, are expected to break the $US500 barrier shortly; nine-pin prices should fall accordingly.

After quality of output, speed is rated second in importance, according to IDC — on a par with price, software support and flexibility. Again, vendors are responding. They must now compete with speeds offered by lowend page printers — a 6 page/min laser printer is about the equivalent of a 300 char/sec serial printer. Twenty-four-pin devices typically offer draft speeds of 180 char/sec to 240 char/sec.

Recent price-cutting by vendors such as Epson, Star Micronics, Fujitsu and Panasonic is a strategic response by the Japanese to the appreciating yen and IBM's recent announcement of its Personal System/2.

The price cuts indicate the Japanese will continue to offer low prices in spite of yen appreciation. Their worldwide market presence allows them to achieve volume efficiencies that result in competitive prices.

Japanese vendors are somewhat justified in their concern about IBM's recent system and printer announcements. IBM's products have been favorably reviewed, and IBM does not have to contend with a currency dilemma, assuming the US dollar remains weak.

The future for the serial dot matrix market looks bright. This technology will continue to account for close to 60 per cent of all printers shipped in 1981. Despite a slight dip in share, nine-pin devices should remain dominant until 1991. Twenty-four pin printers will continue to fall in price and grow in share.

● *Angele Boyd is a US-based research analyst for the printer market program at International Data Corp.*

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BUYING

Which printer?

There is more to buying a printer than getting the cheapest, fastest model you can find. Glenn Cooper explains

I WOULD define the choosing of a suitable printer the second most important part of your computer system.

These days businesses are discovering that there is more to buying a printer than getting the cheapest, fastest model you can find. The discovery is often made when just such a printer fails in the midst of an important project, because it could not handle the job.

To choose the right printer you need to answer three questions:

- ☐ What job do you want the printer to do?
- ☐ How much volume will the printer be printing?
- ☐ What printer options are available for that job?

This report is mainly concentrated on the third question, with a printer chart to assist with workload calculation.

Printers are used for data processing, word processing, desktop publishing and industrial graphics. By combining the information in this report with your own definition you should be able to narrow down your printer choices and make the correct choice.

There are three primary types of printers:

- ☐ The Dot matrix printer has print heads which have a series of small wires that are pushed against the ribbon and paper to form a matrix to create characters.
- ☐ Line printers are typically band technology where the character is fully formed on a band or chain and is hammered against a ribbon to imprint the character on to the paper.
- ☐ Page printers include such technologies as deposition, liquid crystal shutter, and laser printing. Lasers are the most dominant.

Some examples of common laser printers are the Laserten from Qume Corporation and HP Laserjet from Hewlett-Packard.

If we assess the requirements of the main business users for computer printers we can define the type of print required.

Data processing uses the dot matrix type of printer. A light workload printer has 120-180 chars/sec with paperfeed speeds of 5cm to 15cm a second. Applications vary greatly, but should be limited to short text speadsheets and general letters.

Medium workload is used for full-time number crunchers and small businesses. Speeds of 180-120 chars/sec with a 132 column print width are minimum requirements. Form speed should be in the vicinity of 20cm a second to obtain reasonable throughput. Examples are OKI Microline 193, 293, NEC P7, Epson 1500.

A heavy workload printer should have a minimum speed of at least 200 char/sec, but preferrably 400 char/sec with a form feed of 20-25cms. The printer is larger along the print head to dissipate heat. This type of printer will print up to 15,000 pages a month and sustain continuous print runs of one or two hours. Examples are OKI Microline 294, Mannesman Tally 490, Dataproducts 8070 and Epson.

A very heavy workload printer is used when data processing for reports, listings

(Continued page 18)

	WORKLOAD PAGES PER MONTH (thousands)			
APPLICATIONS	Light 0-2	Medium 2-10	Heavy 5-20	Very Heavy 50-100
DATA PROCESSING	OKI 183	OKI 293 294	DP8070 Genicom 3410	DP615 Genicom
WORD PROCESSING	Qume LP20	Qume Sprint II	Qume, Sprint II Scripten, Laser	DP2665
INDUSTRIAL GRAPHICS	—	OKI 294	Genicom 3000	Genicom 4000
DESKTOP PUBLISHING	—	HP, Qume NEC	Qume DP	DP2600 HP2000

● *Glenn Cooper is managing director of C&PA (SA) and chairman of C&PA Corporate.*

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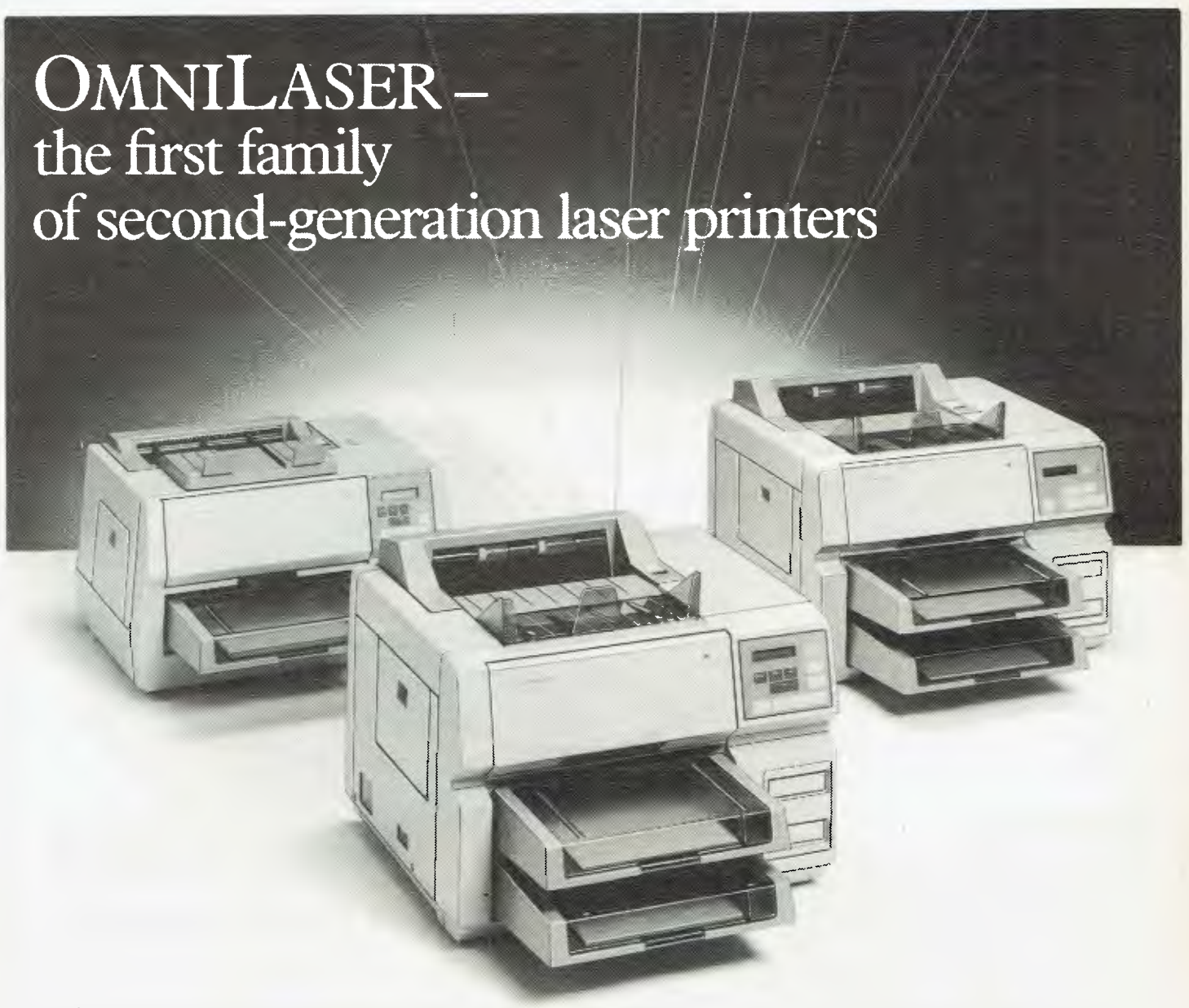

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USER

Teamwork smoothes

WHAT attracted me to Legal and General was the fact that the company recognised data processing as an integral part of the corporate planning and strategy process. So said Tom Doxford, general manager of Information Systems for Legal and General in Australia.

Doxford was speaking from his top floor office at Legal and General's St Leonards national head office in Sydney — the fact that he resides there as an equal member of Legal and General's national management team speaks volumes about the importance that the group accords its DP department.

Doxford, a former IBM man of 22 years, speaks glowingly of his four years with Legal and General.

"It has been my responsibility to ensure that DP plays an important role in Legal and General's future. We in IS can talk to Legal and General people who are at the business end. We work together, as a team," he said.

Doxford's experience with IBM equipped him for his current position. He joined the IBM service bureau before moving into production. He later managed IBM's Perth service bureau.

"Programming, quoting, selling, you name it, I did it all in Perth. For six months I did not have enough people to cope with the workload. The next six months, there was not enough work to go around. That sort of experience gives you a new perspective on the business world," he said.

By the mid-1970's, Doxford was head of the Sydney, Melbourne, and Canberra service bureaus for IBM.

By the late-1970's, IBM had closed its service bureaus — the size of computing hardware had dropped and the company was concentrating on marketing direct to the customer.

Doxford entered the sales arena, but he was missing the DP boiler-room environment. In 1983, the Legal and General position was proposed. Doxford had spent more than two years selling IBM to the insurance industry, so he was the natural choice.

When he arrived at Legal and General, he found an NCR-equipped DP department, headed by Bernard Simpson, who had a 17-year background in DP.

He admired Simpson for being able, not only to cope with, but to master the exercise which Doxford nursed through — a changeover. Out went NCR, and in came IBM.

"We had been an NCR customer for years, but the bulk of software packages were for IBM compats," said Doxford.

The NCR hardware with which Legal and General had labored for years was being phased-out over 12 months in favor of an IBM 434 Group 2.

"It was not easy, no changeover ever is. It was a massive investment and meant having to duplicate everything for a year or more," said Doxford.

By the end of 1984, everything in the Legal and General computer had been converted to IBM.

"We are not a techo company, we are a life insurance and investment company. We are not interested in toying with a mix of hardware to play games with. We are more interested in the best insurance tool we can provide," he said.

But that has not prevented Doxford looking to the future.

"I came to Legal and General with the conviction that the days of impact printers were numbered. Bernard and I spent three

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Choosing the right printer

(Continued from page 17)

and large general reports at 600 char/sec. A line printer is usually required, either in band or dot matrix form. The printer should handle up to 100,000 pages a month at high speed. There are only two major players in this field, Dataproducts LB600 series and Genicom.

Desktop publishing — laser beam technology producing newsletters, price lists and technical manuals — requires a laser printer that can mix text and graphics with a near-typeset quality.

Light workload — laser printing requires a certain volume before it is cost effective. You may be able to get results from a dot matix printer or a small daisywheel printer.

Examples are Qume letterpro plus or OKI Microline 293.

A medium workload printer requires eight pages a minute speed with enough memory to do a partial page at 300 dot/in. A variety of resident fonts saves money on font cartridges.

A heavy workload printer has a typical speed of 10-12 pages a minute with memory to print a full page in 300 dot/in mode. A 250-500 sheet input tray is required and a large selection of fonts and font cartridges should be available. Output should be collated with a high quality output. Examples are Qume Laserten Plus, Dataproducts LZR-1230 and Genicom.

A very heavy workload printer requires 20-plus pages a minute, page description language with a large number of fonts. An example is the Dataproducts 2665, 26 page-a-minute laser.

USER

switchover

years looking for the right non-impact system."

His research convinced him that the future did not lie with laser printers. He discovered the next generation in non-impact printers came in the form of ion deposition — smaller, faster and quieter than comparative laser printers and with a fraction of the parts.

Doxford found that there was an ion deposition printer newly available in Australia — the Datagraphix 4800, from Computer Resources Company. He quizzed four Datagraphix 4800 users across the US. The answers were positive.

"One of the big exposures was being the first user of the product in Australia. But Legal and General would not be where it is in the insurance market today if we were risk avoiders. I calculated that we had an 80 per cent chance of being right by choosing the Datagraphix," said Doxford.

Today, six months after installing the Datagraphix, Doxford is all smiles.

"Legal and General people love the non-reel "people paper" — it fits snugly into filing cabinets and so on. And I am delighted by the speed and the reliability of the Datagraphix 4800. I considered buying two — you can get two 4800's for less than the price of a comparative laser printer — one as a backup. But I have deprived the boys at Computer Resources of a second sale for now, because the first unit has been so reliable.

"You know, the Datagraphix 4800 is the only piece of hardware in the computer room which is not IBM," he said.

Doxford hopes the Legal and General print shop will eventually use the Datagraphix printer to produce most internal forms, supplementing their existing capacity.

Pilot projects

Several pilot projects are now underway to help achieve Legal and General's goals — to improve investment results, to improve sales, and to improve customer service.

In addition to the 200 inhouse terminals at Legal and General, there are 140 Toshiba laptops used by the company's agents.

The company is also piloting an electronic messaging system. An electronic mail system using the IBM Display Writer is already installed, but the next generation could come from the messaging pilot.

"We have high expectations for it. Our agents will be able to communicate with us early each morning, without playing telephone tag, then spend the day on the road. That night, they can check the answers to their queries up on the screen.

"This will increase both the productivity and the profitability of our agents, and those factors are at the heart of Legal and General's future success," said Doxford.

Most gratifying of all, said Doxford, is the latitude given their MIS by Legal and General management.

"If we want to lead the way with ion deposition printers after studious analysis, I am backed to the hilt. And I am able to spread our IS dollars evenly across all sections and applications, unlike many an MIS who is forced by the finance director to put too much emphasis on finance department applications.

"At Legal and General, we know what we do best, and we do it well. The same goes for our Information Systems."

'We aren't interested in toying with a mix of hardware . . . we are interested in the best insurance tool'

■ *Architects of the Legal and General changeover . . . Bernard Simpson (left) and Tom Doxford*

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PRODUCTS

Eight offerings from Olympia

OLYMPIA (Australia) marks its debut on the computer printer market with the launch of four dot-matrix models, three daisywheels and a laser printer, said to put out six pages a minute. The nine-pin dot matrix NP30, NP60, NP80 and NP136 are claimed to offer speeds ranging from 130 to 200 char/sec draft mode. The topend models also feature a 7K-byte buffer and IBM/Epson emulation. The ESW 1000, 2000 and 3000 daisywheels are said to produce 17, 25 and 35 char/sec respectively, and a variety of typestyles for letter, quality applications. The new Laserstar 6 features a 1M-byte buffer and Diablo 630 and HP Laserjet Plus emulation. Options include 512K-byte memory extension, a range of font cards, and extra emulation cards.

Olympia (Australia) Pty Ltd, 59-61 Dickson Ave. Artarmon, NSW 2064. Tel: (02) 439 3444.

Heavy duty impact 'alive and growing'

A 2000 line/min band printer, the Fastwriter Model 4285, has been announced by Genicom Australia Pty Ltd. A Genicom spokesman said the company believed that heavy-duty impact printing was alive and growing despite the push by non-impact technology. IBM had endorsed impact printing with the release of heavy-duty band printers about a year ago for use with high-level mini systems.

The spokesman added that price, which was yet to be determined, would be below competitive products. Features of the Fastwriter include integral power stacking, intelligent control panel, Dataproducts interface, and host system communication links. Dual speed operation for improved printing quality is available.

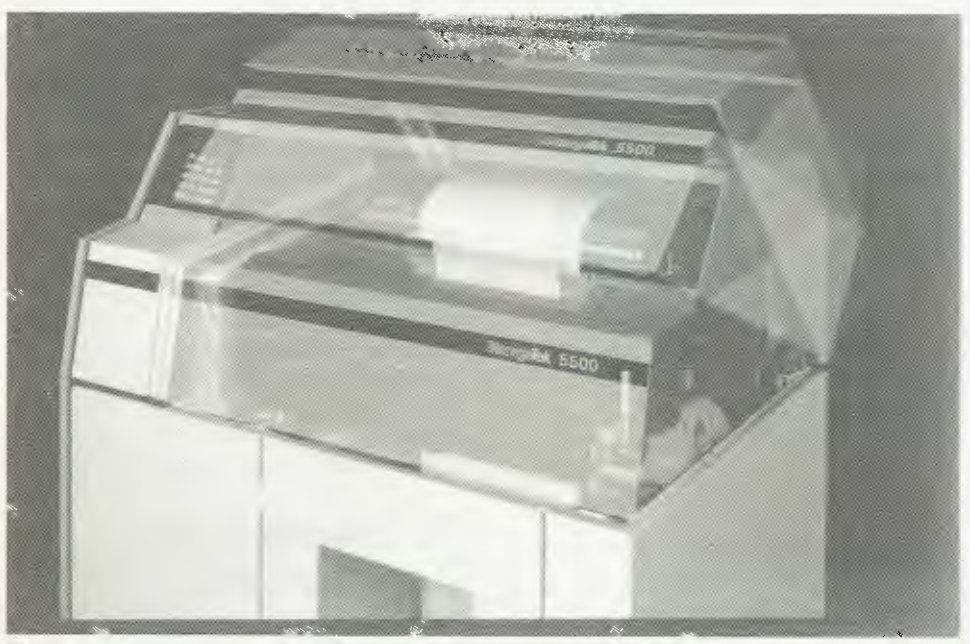
The Fastwriter will be available early next year.

Genicom Australia Pty Ltd, 12/175 Gibbes St, Chatswood, NSW 2067. Tel: (02) 406 6411.

Storage Technology enhances laser

STORAGE Technology of Australia (Storagetek) has enhanced its 6100 laser printer subsystem. With advanced function printing (AFP) support, which incorporates an all-ports-addressable controller with more than 5M-bytes of memory, users can manipulate and format complex pages without any degradation of throughput, it claims. The 6100 with AFP, available in the fourth quarter, is targeted particularly at the engineering and publishing sectors, and other applications where the volume and complexity of text and data is of a similarly high level. Compatibility with IBM's AFP software set is offered, with Print Services Facility, Print Management Facility, and Overlay Generation Language. The new high-performance hardware options, in the shape of a forms overlay buffer and an expanded matrix memory, are also claimed to enhance performance and versatility. The forms overlay buffer allows users to build a full page electronically before printing. The expanded matrix memory makes it possible to increase the number of character sets from four of 64 characters each to 64 sets of 255 characters each.

Storage Tek Australia Pty Ltd, 174 Pacific Hwy, St Leonards, NSW 2065. Tel: (02) 438 4844.



■ *Storage Technology's 5000 series dual hammerbank impact printer subsystem*

PC model from Amstrad

THE DMP 4000 is a new dot matrix from Amstrad Electronics. Available in Australia through Mitsubishi Electric AWA Pty Ltd, it offers speeds of up to 200 char/sec, or 50 char/sec in near letter quality mode. Tractor and sheet fed paper in widths up to 15in is accomodated. The DMP4000 will operate with the Amstrad PC and other IBM PC-compatibles with a standard parallel interface. Recommended retail price is $A799.

Mitsubishi Electric AWA Pty Ltd, 348 Victoria Rd, Rydalmere, NSW 2216. Tel: (02) 638 8444.

Color desktops suit Vax, IBM PC

DIGITAL Equipment Corp (Australia) has announced two color desktop printers for use with Vax and Microvax systems and IBM PC-compatibles. Both the LJ250 and LJ252 non-impact printers can output text and graphics to paper or transparencies. Target markets include managerial, clerical and technical personnel in professional, engineering and scientific operations. The new models are compact and transportable, weighing less than 5kg. They provide printed output in up to seven primary colors at 180 x 180 dots/in and up to 255 colors at 90 x 90 dots/in. Maximum print speed for text-only documents is claimed to be 167 char/sec. Due for delivery in early 1988, the LJ250 and LJ252 are priced at about $A3253.

■ *DEC's LJ250 nonimpact color printer. It provides seven primary colors, with 180 by 180 dots/in resolution*

Digital Equipment Corp (Australia) Pty Ltd, Northern Tower, Chatswood Plaza, Railway St, Chatswood, NSW 2067. Tel: (02) 412 5269.

(Continued page 22)

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- WYSE WY50
- ADDS Viewpoint A2
- Televideo 925
- Televideo 950
- Lear Siegler ADM 31

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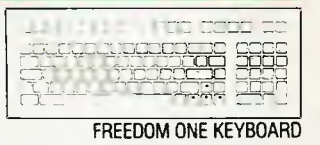

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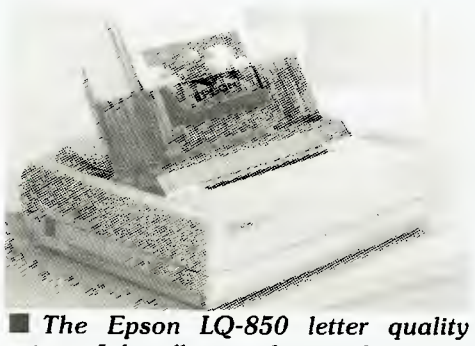
PRODUCTS

(Continued from page 21)

Bidirectional units from Epson

EPSON has introduced new 80 and 136-column 24-pin dot matrix printers. The LQ-850 and LQ-1050 print both draft and text bidirectionally, offering 264 char/sec draft and 88 char/sec letter quality, Epson claims the paper slew rate is 70 per cent faster than in previous models, the vendor said. Graphics are also printed bidirectionally with 360 horizontal dots/in and 180 vertical dots/in. Other features include 55 dbA noise level; ESC/P emulation; two builtin fonts selectable from the front control panel; builtin parallel and serial interfaces, and a 6K-byte buffer. Meanwhile Epson's LQ-2500+ 24-pin dot matrix printer, replacing the LQ-2500, significantly reduced its noise level down to 57 dbA (maximum level), a spokeswoman said.

Epson Australia Pty Ltd, Unit 3, 17 Rodborough Rd, Frenchs Forest, NSW 2086. Tel: (02) 452 5222.

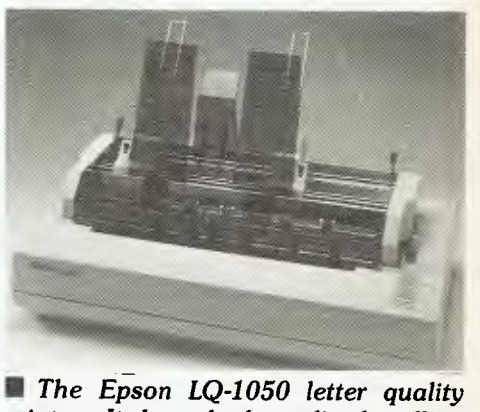


■ ***The Epson LQ-850 letter quality printer. It handles cut sheet and continuous paper simultaneously***

Laserline 6 has HP emulation

THE OKI Laserline 6 desktop laser page printer is now available from Logo Computer Centre. The printer, industry-standard with Hewlett-Packard Laseriet emulation is said to offer text and graphics output resolution of 300 dots/in in 15 resident and 27 optional fonts, and in portrait and landscape orientations. Serial and paralle ports are built in. Most of the popular desktop publishing packages are supported, including Microsoft Word, WPS-PC, Wordperfect, Ventura Publisher and Aldus Pagemaker. Logo is offering the OKI Laserline 6 at $A2995.

Logo Computer Centre, Suite 303, Henry Lawson Business Centre, Birkenhead Point, Drummoyne, NSW 2047. Tel: (02) 819 6811.



■ ***The Epson LQ-1050 letter quality printer. It has dual media handling capability***

Draft mode claim 450 char/sec

US-based company Okidata recently announced a 24-pin dot matrix printer with four speeds and a variety of paper handling techniques. The Microline 393 claims a draft mode speed of 450 char/sec, utility mode of 360 char/sec, near letter quality of 180 char/sec and letter quality mode of 120 char/sec. A 19K-byte buffer, expandable to 30K-bytes, is featured along with standard parallel and serial ports, Epson LQ emulation and tractor feed paper handling. Bitmapped graphics output is claimed to offer 360 × 360 dots/in resolution. Paper handling also includes support for multipart forms, cut sheets and envelopes. Options include single and dual bin sheet feeders, and a color version is available.

Okidata, 532 Fellowship Rd, Mount Laurel, New Jersey, US 08054. Tel: (609) 235 2600.

Minicomp laser enhancements

MINICOMP now offers a range of new enhancement products under the JLaser banner. Offering include the JSX adapter interface which allows users of the Hewlett-Packard Laser Jet Series II and Canon LBPS-II to take advantage of JLaser products; the JLaser SA and JLaser Plus SA printer/scanner controllers, designed to allow faster and more efficient use of popular desktop publishing packages; and JLaser LP, software providing Hewlett-Packard Laserjet compatibility for JLaser Plus.

Minicomp Pty Ltd, 104-108 Mount St, North Sydney, NSW 2060. Tel: (02) 957 6800.

16 international character sets

BELL & HOWELL Australia has released a new P6000 series of line printers for offices and computer room. The two new models, made in the US by Printronix, are designed for multimode printing in a shared resource environment. Mainframe users can print out material in high speed draft, and the PC-based office worker can produce graphics and near letter quality (NLQ) correspondence. The P6000 makes it possible to mix 12 different pitch setting, 16 different international character sets and a number of font styles on a single line. Print speeds will vary according to the model and application, but are claimed to range up to 180 lines a minute in correspondence mode and 800 in high-speed draft. Optional interfaces allow connection to IBM mainframes.

Bell & Howell Australia Pty Ltd, 9 Short St, Chatswood, NSW 2067. Tel: (02) 437 7111.

■ MORE NEW PRODUCTS — P26

When a desktop laser printer can't hack it...

...And when a $1/4 million production laser is overkill, you now have a real alternative.

The C ITOH CIE 3000S Ion Deposition printer.

The advantages of laser printers are undeniable, but in a high printing production environment their 8ppm output rate can be a real hindrance. Until now, this probably meant that you were faced with installing multiple lasers and living with all the attendant management problems that this implies.

The CIE 3000S provides the ultimate solution. With it you can output superb quality documents at 30ppm - That's up to an incredible 150,000 pages per month!

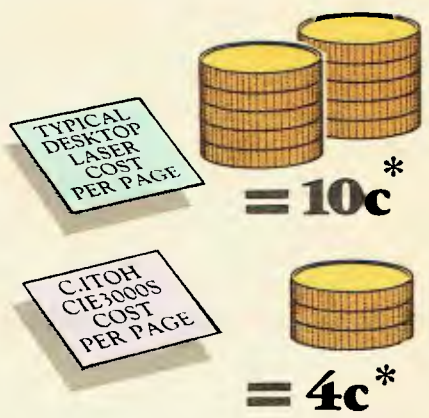
Of course, with C ITOH Ion Deposition Technology you don't have to forego any of the advantages you had with laser printers. You can store multiple forms and print the form along with the information - just as before.

With an array of multiple fonts and point sizes, plus proportional spacing, your documents will look like they were typeset and printed at great expense.

Graphics features include line drawing, shading, reversed type and bit - mapped images.

The CIE 3000S uses plain bond paper in A4 or foolscap sizes and form lengths from 7 inches to 14 inches. So there's no need to even change your current paper.

* Approximate costs based upon U.S. comparisons



But at what cost?

Now you may think that such capability and capacity could only come at a high price - Not so!

At a per page cost of around 4 cents including paper, the CIE3000S is set to start saving you money from the first day.

And compatibility?

Implementing the CIE 3000S is simple. It is fully compatible with IBM and DEC as well as a variety of other host systems.

So if your printing environment demands high throughput, line printing, word processing and graphics, and your looking for a printer with real capability, superb quality and low per page cost, call us about the C ITOH CIE 3000S.

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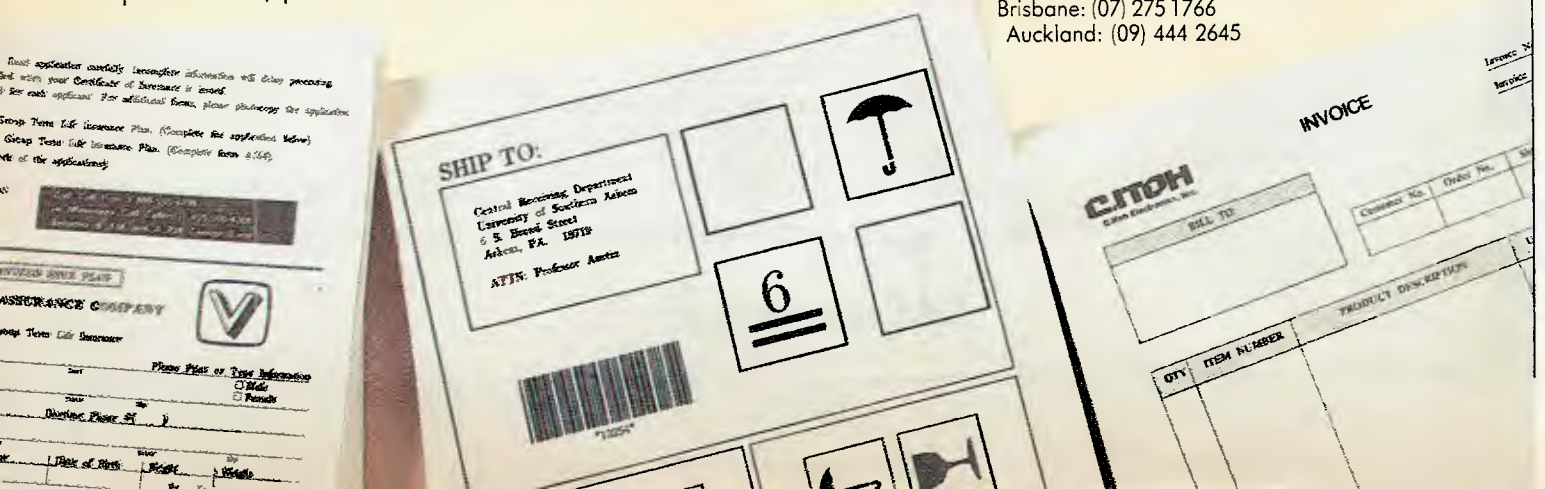

SPOTLIGHT ON
High-end dot matrix

compiled by Gillian Sidebottom

IN SPITE of a tendency in the industry to focus on non-impact technology as the way ahead — laser printers in particular — there is no doubt that impact printers are still alive and very much kicking.

Today's products are a far cry from the dot-matrix printers of yesteryear, which produced output considered by most users to be fit only for green bar computer stationery.

Now the market is characterised by an impressive array of highly advanced, full-featured products offering a combination of fast speeds and high-quality printed output.

As printer applications have become more demanding and non-impact technology has served as a competitive impetus, it is the "top of the range" dot matrix printers — often featuring high-density printheads with either 18 or 24 pins (wires) that have found themselves, deservedly, in the limelight.

As more users require their printers to integrate text and graphics, dot-matrix printers are increasingly gaining acceptance in the world of business graphics and desktop publishing. Due to their high speed, impact printers can be a valuable tool in producing draft graphics output as well as letter-quality correspondence. Many models also support color and multiple fonts and are priced to fit a broad range of budgets.

Other enhancements to dot matrix products include: smaller footprint; improved paper-handling, quieter operation; expanded memory; the availability of enhanced font cartridges and cards; color printing, and improved print media.

Product Model/ Manufacturer (Model)	Price ($A incl tax)	Specification: Number of pins	Standard interface(s)	Internal Buffer capacity	Printer emulations	Number of resident fonts	Number of font card slots	Paper handling: Cut sheet/continuous feed	Automatic sheet-feeder (number of sheets)	Tractor/Friction feed	Maximum paper width (mm)	Print characteristics: Letter/NLQ speed (char/sec)	Draft speed (char/sec)	Text Resolution (dots/in)	Graphics resolution (dots/in)	Multiple copies	Color printing	Reliability: MTBF (power on hours)	Printhead life (million strikes)	Operating noise level (dBA)	Documentation	Warranty
Adler Business Machines Pty Ltd — 34 Waterloo Rd, North Ryde, NSW 2113.																						**Tel: (02) 888 7644**
Star NB-15	$2033	24	PS	16K to 32K	IBM PC compatible, Epson LQ1500, Toshiba P351, Qume Sprint II	1	2	✓	✓ (200)	T/F	388	100/83	300/250	24 x 15 LQ 24 x 9 draft	8 or 24 x 810	1 + 3	—	—	200	61.5	✓	✓
Star NB-2415	$1684	24	PS	5K	—	1	2	✓	✓ (200)	T/F	388	72/60	216/180	24 x 31 LQ 24 x 9 draft	24 x 816	1 + 2	—	—	200	61.5	✓	✓
Anitech — 1 Carter St, Lidcombe, NSW 2140.																						**Tel: (02) 648 1711**
C Itoh C815	$3995	24	PS	42K	IBM-PPXL, Toshiba P351, Qume Sprint II	2	1	✓	✓	T/F	407	162	570	—	180 x 360	1 + 3/1 + 4	—	6000	—	51	✓	✓
C Itoh C715A	$2550	24	PS	32K	IBM-PPXL, Epson LQ1000 Toshiba P351, Diablo 630	1	1	✓	✓ (100+100)	T/F	407	100	250	12 x 24 (draft) 36 x 24 (LQ)	360 x 180	1 + 3	Opt	—	100	56	✓	✓
Apple Computer Australia Pty Ltd — 37 Waterloo Rd, North Ryde, NSW 2113.																						**Tel: (02) 888 5888**
Apple Imagewriter LQ	$2795	27 (3 x 9)	S (Appletalk Opt)	5K	Apple Imagewriter II	4	—	✓	✓ (3)	T/F	375	115/90	250	72, 140, 216	216	1 + 4	✓	6000	400	N/A	✓	✓
AWA / Measurement & Control Division — Unit C, 8 Lyon Park Rd, North Ryde, NSW 2113.																						**Tel: (02) 888 9000**
Seikosha SL80AI	$970	24	P	16K	Epson LQ, IBM	2	—	✓	—	T/F	250	45	135	—	192	1 + 2	—	—	20	52	✓	✓
Seikosha SBP-10	PoA	18	PS	64K	Epson, IBM	2	—	✓	✓ (100)	T/F	375	200	400	—	217	1 + 2	—	—	—	—	✓	✓
Brother Industries (Australia) Pty Ltd — 7 Khartoum Rd, North Ryde, NSW 2113.																						**Tel: (02) 887 4344**
Brother M-1742L	$1595	24	PS	16K to 48K	Epson LQ-1000, IBM-PP XL Diablo Brother HR series	2	1	✓	Opt (100)	T/F	420	60	180	360 x 180	60, 90, 120, 180, 360	1 + 2	—	4000	100	58	✓	✓
Brother M-4018	$3099	18 (2 x 9)	PS	48K to 80K	IBM-PP, Epson FX	3	1	✓	Opt (100 x 2)	T/F	420	100	480	240 x 216	60, 72, 80, 90, 120, 144 & 240	1 + 4 (rear-feed, 1 + 5 (bottom feed)	Opt color ribbon	6000	200	57	✓	✓
Canon Australia Pty Ltd — 10 Hall St, East Hawthorn, Vic 3123.																						**Tel: (03) 200 6200**
Canon A60	$1225	18	PS	8K	IBM GP, Epson FX	2	4	✓	✓ (40)	T/F	254	100	200	60, 120, 240	60, 120, 240	1 + 2	—	—	100	57	✓	✓
Canon A65	$1425	18	PS	14K	IBM GP, Epson FX	2	4	✓	X	✓	406	100	200	60, 120, 240	60, 120, 240	1 + 2	—	—	100	57	✓	✓
Communications & Peripherals Australia Pty Ltd — 25 Hardner Rd, Mount Waverley, Vic 3149.																						**Tel: (03) 543 8833**
OKI ML 292/ ML293	$1387/ $1691	18	PS	8K to 32K	IBM GP	46 type styles	—	✓	✓ (170)	Bidirectional forms tractor	400	100	200	17 x 17 matrix	288 x 144 (black)/ 144 x 144 (color)	1 + 3	✓	4000	200	N/A	✓	✓

Key: ✓ = Feature available; — = Feature not available or information not supplied; Opt = Optional; P = Parallel interface, S = Serial Interface; IBM-PP/GP = ProPrinter/Graphic Printer; CSF = Cut sheet feed; cps = characters per second; NLQ = Near letter quality; MTBF = Meantime between failure.

The Product Spotlight on 18/24-pin Dot-Matrix Impact Printers is based on information obtained from a survey of vendors conducted between July 13 and September 11, 1987. All details should be checked with the respective companies as listed.

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- ADDS Viewpoint A2
- Televideo 925
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- **DEC VT 52**
- **Data General DASHER D211**
- **Data General DASHER D210**

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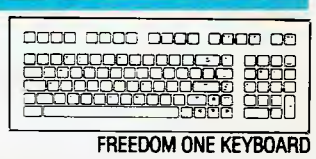
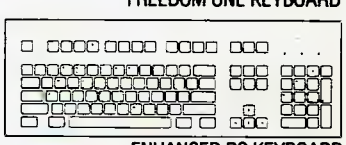
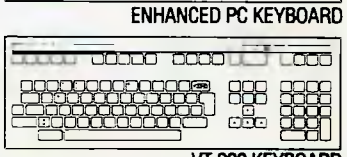

FREEDOM ONE KEYBOARD


ENHANCED PC KEYBOARD


VT 220 KEYBOARD

Product Model/ Manufacturer (Model)	Price ($A incl tax)	Specification: Number of pins	Standard interface(s)	Internal Buffer capacity	Printer emulations	Number of resident fonts	Number of font card slots	Paper handling: Cut sheet/continuous feed	Automatic sheet-feeder (number of sheets)	Tractor/Friction feed	Maximum paper width (mm)	Print characteristics: Letter/NLQ speed (char/sec)	Draft speed (char/sec)	Text Resolution (dots/in)	Graphics resolution (dots/in)	Multiple copies	Color printing	Reliability: MTBF (power on hours)	Printhead life (million strikes)	Operating noise level (dBA)	Documentation	Warranty
Dataproducts Corp — 81 Frenchs Forest Rd, Frenchs Forest, NSW 2086. Computer Resources Company — 33-35 Lionel Rd, Mount Waverley, Vic 3149.																					**Tel: (02) 451 3533 Tel: (03) 543 5638**	
Dataproducts 8070 Plus	$3612	18	PS	4K	IBM-Color, IBM-GP, Dataproducts P series	1	—	✓	✓ (200)	T/F	375	100	400	36 x 18 matrix (LQ)	165 x 82.5	1 + 5	Opt	4000	500	58	✓	✓
Dataproducts 9044	$2103	24	PS	8K	Epson LQ800/1000, Diablo 630	2	1	✓	✓ (150/200)	T/F	375	83	300	12 x 24 (draft) 36 x 24 (LQ)	60/120/240 x 72	1 + 3	Opt	5000	500	55	✓	✓
Dataproducts 9034	$1770	24	PS	8K	Epson LQ800/1000, Diablo 630	2	1	✓	✓ (150/200)	T/F	250	83	300	12 x 24 (draft) 36 x 24 (LQ)	60/120/240 x 72	1 + 3	Opt	5000	500	55	✓	✓
Datronics Corp Ltd — 376-380 Lane Cove Rd, North Ryde, NSW 2113.																					**Tel: (02) 887 9333**	
Citizen HQP-45	$1550	24	PS	24K	IBM and Epson LQ-1000 (Opt cards)	2	1	CSF	✓ (100)	T/F	400	66	200	360, 180, 120	360	1 + 4	—	5000	200	57	✓	✓
Epson Australia Pty Ltd — Unit 3, 17 Rodborough Rd, Frenchs Forest, NSW 2086.																					**Tel: (02) 452 5222**	
Epson LQ-2500+	$2390	24	PS	8K	—	6	2	✓	✓ (60)	T/F	406	90/108	270/324	360 x 180	360 x 180	1 + 3	Opt	6000	2	57	✓	✓
Epson LQ-800	$1170	24	PS	8K	IBM-GR, D-630	2	1	✓	✓ (60)	T/F	257	60/70	180/216	360 x 180	360 x 180	1 + 1	—	4000	2	66	✓	✓
Epson LQ-1000	$1610	24	PS	8K	IBM-GR, D-630	2	1	✓	✓ (60)	T/F	406	60/70	180/216	360 x 180	360 x 180	1 + 1	—	6000	2	66	✓	✓
Elmeasco Instruments Pty Ltd — Unit 4, 2 George Place, Artarmon, NSW 2064.																					**Tel: (02) 427 3322**	
Facit B3350C	$2675	18	PS	12K	Epson FX/JX, IBM-PP & Facit	1	1	✓	✓ (125 + 125)	T/F	415	100	200	9 x 9 (draft) 18 x 25 (NLQ)	240	1 + 3	Std in C version	4000	100	55	✓	✓
Facit C7500	$5250	18	PS	4K	Epson FX/JX, IBM-PP	1	—	✓	✓ (125)	T/F	415	100	400	9 x 9 (draft) 17 x 18 (NLQ)	20	—	✓	4000	200	57	✓	✓
Fujitsu Australia Ltd — 41 McLaren St, North Sydney, NSW 2060.																					**Tel: (02) 959 6555**	
Fujitsu DL5600 (available from October)	PoA	24	PS	32K	IBM-PP, Diablo 630, DPL24	—	—	—	—	T/F	—	135	405/486	—	—	1 - 5	Opt	8000	400	55	✓	✓
Fujitsu DL3400	$1650 (ex tax)	24	PS	256B, 2KB, 8KB, 24KB	IBM-GP/PP, Diablo 630, Epson JX-80	2	1	✓	—	T/F	420	60	240	360 x 180	360 x 180	1 + 2	Opt	8000	300	55	✓	✓
Fujitsu DL2400/ DL2400 color	$1850/2166 (ex tax)	24	PS	8KB	IBM-GP/PP, Diablo 630, Epson JX-80	2 (+5 opt)	1	✓	—	T/F	420	72	216	360 x 180	360 x 180	1 + 3	Color version only	6000	400	53	✓	✓
Fujitsu DL2600/ 2600 color	$2450/2730 (ex tax)	24	PS	8KB	IBM-GP/PP, Diablo 630, Epson JX-80	3 (+4 opt)	1	✓	—	T/F	420	96	288	360 x 180	360 x 180	1 + 4	Color version only	6000	400	55	✓	✓
Fujitsu DL3300	$1450 (ex tax)	24	PS	256B, 2KB, 8KB, 24KB	IBM-GP/PP, Diablo 630, Epson JX-80	2	1	✓	—	T/F	203	60	240	360 x 180	360 x 180	1 - 2	Opt	8000	300	55	✓	✓
Genicom (Australia) Pty Ltd — Unit 12, 175 Gibbes St, Chatswood, NSW 2067.																					**Tel: (02) 406 6411**	
Genicom 1020 1025 1020C 1025C	$2380 $1912 $2692 $2225	18	PS	2K, 8K opt	IBM GP, Epson FX/JX, Diablo 630	11	3	✓	—	F/T	1020 400 1025 275	100	200	—	200/144	1 + 3	Upgrade available	4000	100	<60	✓	✓
Genicom 3530/3540	$11,184	18	Coax Twinax	—	ANSI x 3.64, IBM System 34/36/38	2	Opt 5	✓	✓	F/T	387/300	100	400	—	9 x 9 (draft) 9 x 18 (LQ)	1 + 5	✓	2500	300	60	✓	✓
Genicom 3320	$5677	18	PS	512 char, 4K opt	IBM GP, Diablo 630, ANSI	5	—	✓	✓	F/T	387	150	300	—	288	1 + 5	✓	2500	300	55	✓	✓
Genicom 3410/3410Q	$5898/$6344	18	PS	512 char	ANSI, IBM PC	4 +2 (Opt)	—	✓	✓	F/T	387	100	400	9 x 9 (draft) 9 x 18 (LQ)	72/144	1 + 5	—	2500	300	61.5/ 55	✓	✓
Hewlett-Packard Australia Ltd — 31-41 Joseph St, Blackburn, Vic 3130.																					**Tel: (03) 895 2895**	
HP Ruggedwriter 480 *New product*	$3750	24	PS	2K to 16K	HP-PCL III, Epson LQ1000/1500	14	1	✓	✓ (100)	T/F	375	240	480	36 x 24 (LQ) 12 x 12 (draft)	180 x 180	4 part forms	—	20,000	5 char/ ribbon	56	✓	✓
Honeywell Bull Australia Pty Ltd — 124 Walker St, North Sydney, NSW 2060.																					**Tel: (02) 923 9660**	
Honeywell Bull 4/66	$4520	18	PS	12K	IBM GP, Epson JX80	2	2	✓	✓ (250)	F/T	444	75/180	400/480	144 x 144	N/A	1 + 7	7 color	7000	—	53	✓	✓
Impact Datascape — 393 Military Rd, Mosman, NSW 2088.																					**Tel: (02) 969 2699**	
Fujitsu DL2600	$2854	24	PS	8K	IBM PC, Diablo 630	3	1	✓	✓ (250)	T/F	420	80	240	360 x 180 (LQ)	180 x 180	1 + 4	Opt	6000	400	55	✓	✓
Hermes M400D	$4277	18	P	—	Epson	—	—	✓	✓ (100)	T/F	—	100	400	144 x 360	144 x 360	1 + 4	✓	4000	—	60	✓	✓
IPL Datron Pty Ltd — 79-81 Regent St, Redfern, NSW 2016.																					**Tel: (02) 699 4824**	
OKI Microline 292	$1549	18	PS	32K	Epson, OKI, IBM	2	none	✓	✓ (170)	F/T	212	100	200	9 x 9 matrix	17 x 17 matrix	1 + 3	✓	4000	200	57	✓	✓
OKI Microline 293	$1891	18	PS	32K	Epson, OKI, IBM	2	none	✓	✓ (170)	F/T	400	100	200	9 x 9 matrix	17 x 17 matrix	1 + 3	✓	4000	200	57	✓	✓
OKI Microline 294	$2890	18	PS	32K	Epson, OKI, IBM	2	none	✓	✓ (170)	F/T	400	100	400	9 x 9 matrix	17 x 17 matrix	1 + 3	✓	4000	200	57	✓	✓

Key: ✓ = Feature available; — = Feature not available or information not supplied; Opt = Optional; P = Parallel interface, S = Serial Interface; IBM-PP/GP = ProPrinter/Graphic Printer; CSF = Cut sheet feed; cps = characters per second; NLQ = Near letter quality; MTBF = Meantime between failure.

The Product Spotlight on 18/24-pin Dot-Matrix Impact Printers is based on information obtained from a survey of vendors conducted between July 13 and September 11, 1987. All details should be checked with the respective companies as listed.

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TEXAS INSTRUMENTS
FUJITSU
HEWLETT PACKARD

printers

Product Model/ Manufacturer (Model)	Price ($A incl tax)	Specification: Number of pins	Standard interface(s)	Internal Buffer capacity	Printer emulations	Number of resident fonts	Number of font card slots	Paper handling: Cut sheet/continuous feed	Automatic sheet-feeder (number of sheets)	Tractor/Friction feed	Maximum paper width (mm)	Print characteristics: Letter/NLQ speed (char/sec)	Draft speed (char/sec)	Text Resolution (dots/in)	Graphics resolution (dots/in)	Multiple copies	Color printing	Reliability: MTBF (power on hours)	Printhead life (million strikes)	Operating noise level (dBA)	Documentation	Warranty
Kenelec Pty Ltd — 48 Henderson Rd, Clayton, Vic 3168.																						**Tel: (03) 560 1011**
Datasouth DS-400	$2895	18	PS	16K	Epson MX 80/100, IBM, Diablo 630	4	Opt Rom or down-loadable	Opt	Opt	F/T	375	108	400	9 x 7/ 18 x 48 matrix	400 x 400	1 + 5	—	3500	4	59	✓	✓
Memorex Pty Ltd — 61 Barry St, Neutral Bay, NSW 2089.																						**Tel: (02) 908 2211**
Memorex 2924	PoA	24	PS	to 24K	IBM PP/GP, Diablo 630, Epson JX 80, DPL 24C	5	1	✓	✓	T/F	420	60	180/240	360 x 180 (LQ)	360 x 180	1 + 2	Opt	8000	230	55	✓	✓
NEC Information Systems Australia Pty Ltd — 99 Nicholson St, St Leonards, NSW 2065.																						**Tel: (02) 438 3544**
NEC Pinwriter P6	$929 (ex tax)	24	PS (opt)	8K	Epson LQ	22	—	Opt	Opt (100)	Opt	254	72	180	360 x 360	360 x 360	1 + 3	—	5000	200	56	✓	✓
NEC Pinwriter CP6	$1144 (ex tax)	24	PS (opt)	8K	Epson LQ	22	—	Opt	Opt (100)	Opt	254	72	180	360 x 360	360 x 360	1 + 3	7	5000	200	56	✓	✓
NEC Pinwriter P7	$1210	24	PS (opt)	8K	Epson LQ	22	—	Opt	Opt (100)	Opt	406	72	180	360 x 360	360 x 360	1 + 3	—	5000	200	53/56	✓	✓
NEC Pinwriter CP7	$1447	24	PS (opt)	8K	Epson LQ	22	—	Opt	Opt (100)	Opt	406	72	180	360 x 360	360 x 360	1 + 3	7	5000	200	53/56	✓	✓
NEC Pinwriter P5	$1765	24	PS (opt)	8K to 40K	Epson LQ	22	2	Opt	✓ 180/360	Opt	406	88	220	360 x 360	360 x 360	1 + 3	—	5000	200	48/53	✓	✓
NEC Pinwriter P5XL	$2240 (ex tax)	24	PS (opt)	8K to 40K	Epson LQ, Diablo	22	2	Opt	✓ 180/360	Opt	406	88	220	360 x 360	360 x 360	1 + 3	7	5000	200	48/53	✓	✓
NEC Pinwriter P2200	$785 (ex tax)	24	PS (opt)	8K	Epson LQ	36	1	Opt	✓ (25)	T	254	56	140	360 x 360	360 x 360	1 + 2	—	4000	100	55/58	✓	✓
Olivetti Australia Pty Ltd — 140 William St, Sydney 2011.																						**Tel: (02) 358 2655**
Olivetti DM296-1	$1299	18	PS	6K	Olivetti, IBM GP/PP, Epson FX 85/105, JX 80	1	—	Opt	✓	F T (Opt)	400	90	180/220	20 x 8 matrix	240 x 216	1 + 3	7	4000	200	60	✓	✓
Olivetti DM600	$1938	24	PS	8K	Olivetti, Epson FX/LQ 1500, IBM GP, Diablo 639, Qume	1	1	Opt	✓ (250)	F T (Opt)	424	70	200	20 x 8 matrix	240 x 180	1 + 3	—	3000	185	58	✓	✓
Philips Communication Systems Ltd — 25 Paul St, North Ryde, NSW 2113.																						**Tel: (02) 888 8222**
GP310/GP310C *Shipment due Dec 1987*	C $4500	18	PS	7K	—	—	—	✓	✓ (200)	T/F	380	80	370	9 x 7, 9 x 9, 18 x 50	144 x 144	1 + 3	4 colors	—	500	51	✓	✓
Printerland — 3/211 Ben Boyd Rd, Neutral Bay, NSW 2089.																						**Tel: (02) 908 4311**
Star NB-15	$1799	24	PS	16K to 32K	IBM PC compatible, Epson LQ1500, Toshiba P351, Qume Sprint II	1	2	✓	✓ (200)	T/F	388	100/83	300/250	24 x 15 LQ 24 x 9 draft	8 or 24 x 810	1 + 3	—	—	200	61.5	✓	✓
Dataproducts 9044	$1895	24	PS	—	Epson, Diablo 630	2	—	✓	Opt (100)	T/F	375	83	250	—	60 x 72, 72 x 120, 240 x 70	1 + 4	Opt	5000	—	60	✓	✓
Sigma Data Corporation Pty Ltd — 11th Floor, 157 Walker St, North Sydney, NSW 2060.																						**Tel: (02) 957 3777**
AMT 2013	$4695	18	PS	8K to 40K	Diablo 630, Qume Sprint II, NEC Spinwriter, Epson JX80 IBM etc	up to 7	—	Opt	✓ (200 + 200 + 200)	F-std T-opt	400	45	250	32 x 72 matrix	240 x 240	1 + 3	✓	3800	1 year	—	✓	✓
Star Micronics Australia Pty Ltd — 7/25 George St, Homebush, NSW 2140.																						**Tel: (02) 736 1144**
Star NB241S	PoA	24	P	5K to 21K	Epson LQ1000, IBM-GP/PP	1	2	✓	✓ (120)	T/F	388	72	216	360 x 360	360 x 360	—	—	6000	200	71	✓	✓
Star NB15	PoA	24	P	16K to 32K	Epson LQ1500, IBM-GP	1	2	✓	✓ (120)	T/F	388	110	300	240 cpi	240 cpi	—	—	8000	200	72	✓	✓
Star NB2410	PoA	24	P	8K to 24K	Epson LQ800, IBM-GP/PP	1	1	✓	✓ (120)	T/F	250	72	216	360 x 360	360 x 360	—	—	6000	200	70	✓	✓
Telex Computer Product International Inc — 18th Floor, 100 Miller St, North Sydney, NSW 2060.																						**Tel: (02) 922 4077**
Telex TC4292/4293	PoA	18	PS	8K	—	2	—	✓	Opt on 4293	T	254/394	100	200	17 x 17 matrix	18 x 17 matrix	1 + 3	4 colors	—	—	55	✓	✓
Toshiba (Australia) Pty Ltd — 84-92 Talavera Rd, North Ryde, NSW 2113.																						**Tel: (02) 887 6057**
Toshiba P351C	$2634	24	PS	256 char to 4K	Toshiba, Qume, IBM GP	3	8 cart	CSF	100 + 100	F	364	100	288	120 x 120	360 x 180	1 + 5	8	6000	400	56	✓	✓
Toshiba P341E	$1454	24	PS	256 char to 2K	Toshiba, Qume, IBM GP	2	8 cart	CSF	100 + 100	F	364	72	216	120 x 120	360 x 180	1 + 2	—	4000	200	59	✓	✓
Toshiba P351	$2294	24	PS	256 char to 4K	Toshiba, Qume, IBM GP	3	8 cart	Opt	150/100	F	364	100	300	120 x 120	360 x 180	1 + 5	—	5000	400	58	✓	✓
Toshiba P321SL	$1218	24	PS	256 char/2K/32K	Toshiba, Qume, IBM PP	3	2	CSF	100 + 100	F/T	254	80	216	120 x 120	360 x 180	1 + 4	—	4000	200	51 Quiet mode	✓	✓

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- Televideo 925
- Televideo 950
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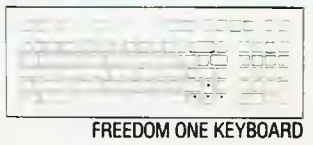
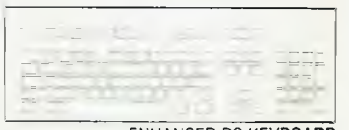

FREEDOM ONE KEYBOARD


ENHANCED PC KEYBOARD

MONCRIEFF

PRODUCTS

New Canon lighter, more compact

CANON Australia has launched a successor to the company's laser printer series. The LBP-8 II is lighter (20.5kg) and more compact than its predecessor, with 512K-bytes memory capacity and two front cartridge slots. Paper handling volumes have been expanded and output either can be in face-up or face-down mode. Canon claims the LBPII's high resolution text and graphics reproduction, multiple printing modes and ability to interface with mainframes, workstations, networks, personal computers and all types of software systems, make it a valuable component in any desktop publishing system.

Canon Australia Pty Ltd, 10 Hall St, East Hawthorn, Vic 3123. Tel: (03) 200 6200.

■ *The AWA Amstrad DMP 4000 dot matrix printer from Mitsubishi Electric*

Nine-pin machines offer optional seven-color kit

AWA Technology Group has just announced the availability in Australia of two new dot-matrix business printers from Seikosha — the MP-1350AI, 80 column model and the MP-5350AI, 136 column model.

Speeds of up to 300 characters a second (draft mode) are claimed for the nine-pin machines and near letter quality printing is available for wordprocessing applications. An optional seven-color printing kit is offered along with automatic paper handling and an operating noise level of 55dBA. Built-in parallel and serial interfaces are provided and printer emulations include the Epson FX and IBM Graphics Printer.

AWA Technology Group, Measurement and Control Division, Unit C, 8 Lyon Park Rd, North Ryde, NSW 2113. Tel: (02) 997 3433.

Design for nine-part forms

THE NEW Mannesman Tally MT 145 computer printer for label, ticket or board forms is now available from Microprocessor Applications (MPA). Designed for up to nine-part forms, the high impact print head is intended to ensure a readable bottom copy. The MT 145 offers speeds of 120 char/sec in a 9×7 matrix and is designed rugged for hostile environments.

MPA Pty Ltd, 101-107 Whitehorse Rd, Blackburn, Vic 3130. Tel: (03) 894 1500.

Ten pages a minute

THE NEW Qume Scripten laser printer for IBM PCs, IBM-compatibles and the Apple Macintosh is now available in Australia through C&PA. Offering speeds of up to 10 pages a minute, the Scripten has new features and printing options which, according to the company, make it a flexible and powerful element in any desktop publishing environment.

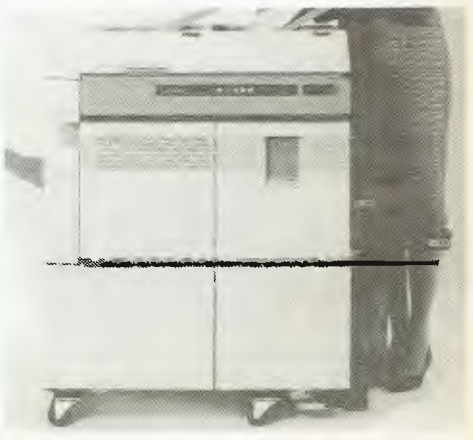
In conjunction with packages such as Pagemaker and Ventura, users can produce documents which merge high quality text in a wide range of type sizes and styles and high resolution graphics on a single page.

C&PA Corporate Pty Ltd, 25 Hardner Rd, Mount Waverley, Vic 3149. Tel: (03) 544 4933.

More speed for Epson dot matrix

THE popular Epson LX-86 dot matrix printer has been enhanced to offer faster print and throughput speeds and more builtin functions. The LX-800 prints at 180 char/sec in draft mode. Throughput is reported to be some 25 per cent faster. Print buffer capacity has also been expanded to 3K-byes and print modes are switch-selectable from a front control panel. A builtin tractor paper-feed is offered as standard, with a single bin cut sheet feeder available as an option.

Epson Australia Pty Ltd, 3/17 Rodborough Rd, Frenchs Forest, NSW 2086. Tel: (02) 452 5222.



■ *Impact's 20 page/min L2000*

AI '87

AUSTRALIAN JOINT ARTIFICIAL INTELLIGENCE CONFERENCE

November 2-4 1987
Sydney Masonic Centre, Australia

KEYNOTE SPEAKERS

* Austin Tate, director, AI Applications Institute, University of Edinburgh.
* Tom Kehler, president, IntelliCorp.
* Ross Quinlan, NSW Institute of Technology.

Forty-nine papers have so far been received for presentation at the conference, including submissions from the US, Japan and Germany. One-third relate to industry applications of AI, one-third to applied AI research, and the balance pure research. These are being evaluated by referees.

Topics short-listed include:
* An expert system for nuclear test ban treaty verification.
* Real time expert systems for industrial plant control.
* Spray painting machine configuration by an expert system written in XL.
* Database oriented expert systems.
* The development and deployment of expert systems in the financial services industry.

Further details from:
AI'87 Secretariat, Stephen Moore, Karen Rickwood (02) 439 5133, Fax: (02) 439 5512, Telex: AA74752. Address: PO Box 929, Crows Nest, NSW 2065.

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Computerworld EXPO

DESKTOPS

New doors opening

Do-it-yourself publishing means a surging market, writes Neil Burn

NEW and exciting methods of publishing are opening up markets for electronic printers.

In particular the arrival of desktop publishing must be seen as a major force for growth in the market.

More and more people, particularly in small to medium-sized business, will be doing their own publishing where, instead of typesetting before being sent to an offset printer, the production will be done directly on an electronic printer.

Their use has, of course, enormous potential benefits for all printing requirements form desktop publishing, through to departmental and into full production.

And as a company with one of the most comprehensive ranges of printers available, Xerox is well placed to meet all marketplace requirements, and is looking to the office of the 21 century.

What has been developed is the concept of document management, as elegantly simply, effective and time-saving as the first great example of document management — the paper-clip-nearly a century ago.

In what amounts to a total office autmation strategy electronic printing plays a key role, combining with other already well-established Xerox strengths in areas of document-related technology such as copiers, word-processing, graphics workstations, publishing systems and the Ethernet architectural standards that link them.

While company sales from non-repographic products account for just over 20 per cent of revenue at present, by 1990 they are expected to more than double to 50 per cent.

Electronic printing will provide the major impetus for that dramatic growth.

Within the overall market, the high volume sector, now worth more than $40 million a year, is expected to double by 1990.

This will occur because Australian industry and government are beginning to appreciate the enormous cost benefits to be achieved with electronic printing.

From the exprience of Rank Xerox alone, there is clear evidence that the significant savings in time and resources from the use of laser printing is being recognised by those companies and institutions or government departments that need personalisation with speed.

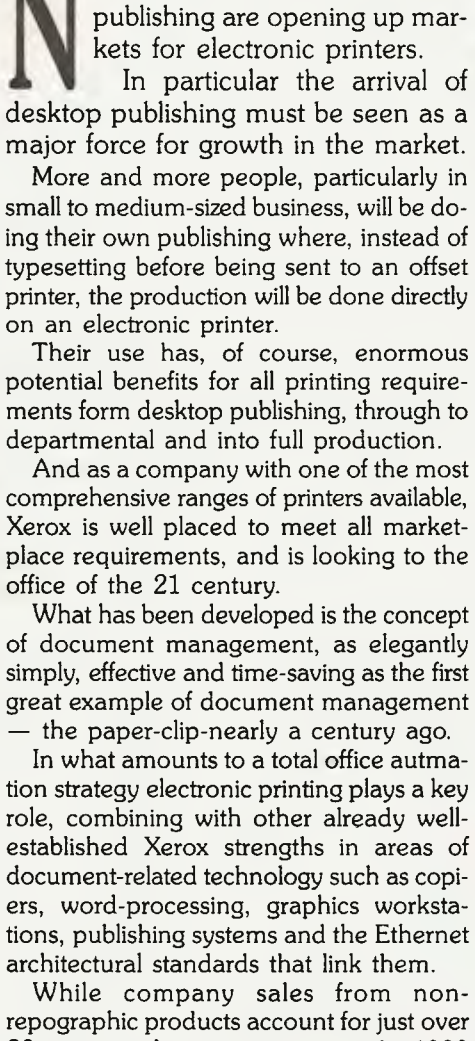
One example is the Department of Social Security, which recently acquired 10 Xerox 8700 and 9700s and a 4050 to improve communications with its clients.

Phil Hoare, director of the department's advices section, said the laser printers will provide its 5,000,000 clients with clear, "plain English" information on their individual payments and entitlements, and will lead to a more efficient use of human and financial resources throughout the department and its regional offices.

With the new personalised laser letters each client can see clearly how his or her entitlements have been calculated, together with the domestic and financial information used by the department in its assessment.

Other areas that have shown particular interest in laser printing include banking and insurance, where companies need high volume output, speed and absolute accuracy, as well as all correspondence to be personalised.

And whether laser printers are used for publishing, in the production of graphics and technical manuals, for personalised direct mail or bar coding, as a means of stock control and information storage, as typesetters or, indeed, as replacements for computer line printers, they are a valuable addition to the concept of the modern office and to the office of the 21st century.



● *Neil Burn is the national marketing manager, advanced systems division, Rank Xerox (Australia) Pty Ltd.*

C&PA

You can't afford not to buy Qume printers

The LaserTEN family of business printers offer you the best in laser printing speed, durability and ease of use.

ITT Qume LaserTEN and LaserTEN PLUS printers are the first laser printers designed from start to finish to fit with ease into the business environment. They offer complete flexibility in printing letter-quality text, business forms and logos, and excellent 300 x 300 dots-per-inch monochrome graphics at 10 pages-per-minute.

SPRINT 11 PLUS family of high-speed daisywheel printers – the standard of quality worldwide

The SPRINT 11 PLUS family is unsurpassed in every measure of letterquality printer performance: speed, printing quality, durability, flexibility and price.

All SPRINT 11 PLUS printers have just the right connections: the ITT Qume connection, an inexpensive plug-in module that instantly interfaces any SPRINT 11 PLUS printer to any popular computer or word-processing system. And, ITT Qume modules come complete with all necessary cabling. Whether your customer's application calls for 55 cps, 90 cps, multiple-form printing, or the extra width and printing capability of the SPRINT 11 PLUS Wide Track (the widest carriage on the market) no letter-quality impact printer delivers more for the money than a SPRINT 11 PLUS from ITT Qume.

Desktop publishing at your fingertips

Not so long ago, if you needed to produce a professional-quality newsletter or manual, there were a couple of options available to you. If your company had its own in-house printshop, you could get on the waiting list to have your project done. Or, you could go to an outside printing facility to have your typesetting and printing done. With the first option, you'd spend a lot of time. With the second, you'd spend a lot of money. Now there's a third option: QumeScripTEN from Qume.

Desktop Publishing

Ventura – Easily the world's most popular desktop publishing software for the IBM PC and compatibles range of computers.

Integrate text and graphics, including scanned images, to produce finished, typeset-quality publications from standard word processing.

Even if you don't have typographic and layout skills, Ventura incorporates a wide selection of pre-designed layouts to help you automatically format typical business and technical documents. Finished documents can be printed on standard dot-matrix, laser and colour ink-jet printers, or they can be output to phototypsetters.

Sold and supported nationally by C&PA

All Qume printers from C&PA have one thing in common. National support. For sales, installation, and service. So no matter where you are, if there's a problem we'll be right there to solve it. For full details and to arrange a demonstration, call your nearest C&PA office today.

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